ANNALS

OF

The Entomological Society of America

Volume XIII SEPTEMBER, 1920 Number 3

NEW OR LITTLE-KNOWN CRANE-FLIES FROM FORMOSA (TIPULIDÆ, DIPTERA).

CHARLES P. ALEXANDER.

During the past eight years, numerous important collections of crane-flies have been made in various parts of the island of Formosa so that now we have an excellent foundation for future work on this fauna. A large and valuable collection of Tipulidæ and Ptychopteridæ has recently been received from Dr. T. Shiraki, Chief of the Division of Entomology of the Agricultural Experiment Station of Formosa. Several species that are undescribed and a number of others that are still insufficiently known were contained in this material so that the collection amply merits a special report. The writer wishes to express his sincere thanks to Dr. Shiraki and his assistant entomologists for the privilege of studying this material. The types are preserved in the writer's collection.

The following altitudes of stations included in this paper were supplied by Dr. Shiraki: Arisan, about 8,000 feet; Funkiko, about 6,000 feet; Kanshiree, about 1,000 feet; Koshun, about 300 to 500 feet; Musha, about 3,700 feet; Noko, about 10,000 feet; Shinchiku (a prefecture; collecting done at 500 to 1,000 feet); Shishito, about 1,000 feet; Taito (a prefecture; collecting done at about 500 feet); Tappan, about 3,000 feet.

The high mountains of Formosa support a rich endemic crane-fly fauna, this including a curious union of Oriental and Holarctic genera. Besides the numerous endemic forms, a considerable number of additional species described from adjoining countries have been taken in Formosa. These include species described from Japan (Alexander), the Philippine

Islands (Bezzi), Sumatra and Java (Edwards, de Meijere and Alexander) and British India (Brunetti). The more important papers dealing with the crane-fly fauna of the island are the following:

Edwards, F. W. A Revision of the Tipulid Genus Styringomyia, Lw.; Trans. Ent. Soc. London, 1914, Part I, pp. 206-227, pl. 19-25, 1914.

Edwards, F. W. New and little-known Tipulidæ, chiefly from Formosa. Ann. Mag. Nat. Hist., ser. 8, vol. 18, pp. 245-269, pl. 12; September, 1916.

Enderlein, Gunther. Studien über die Tipuliden, Limoniiden, Cylindrotomiden und Ptychopteriden; Zool. Jahrb., Syst., vol. 32, pt. 1, pp. 1-88, 1912.

Matsumura, S. Thousand Insects of Japan. Additamenta II, pp. 185-474, pl. 16-25; July, 1916.

Riedel, M. P. H. Sauter's Formosa-Ausbeute. Nematocera Polyneura (Dipt.); Supplementa Entomologica, No. 1, pp. 26, 27; 1912.

Riedel, M. P. The same, part II; Entomologische Mitteilungen, vol. 2, no. 9, pp. 272-276; 1913.

Riedel, M. P. The same, part III; Archiv für Naturgeschichte, Abt. A, vol. 5. pp. 109-116; 1916 (August, 1917).

Riedel, M. P. The same, part IV, Liriopidae (Ptychopteridae) und Nematocera Polyneura (Dipt.); Annales Musei Nationalis Hungarici, vol. 16, p. 315-320; 1918.

So far as known, the Oriental crane-fly fauna is the richest of all the regions of the world. It is interesting to note that the known fauna of this region is even now far larger than that of either the much better known Palæarctic or Nearctic regions.

Libnotes Westwood.

Libnotes regalis Edwards.

1916. *Libnotes regalis* Edwards, Ann. Mag. Nat. Hist., ser. 8, vol. 18, p. 248.

One female, taken at Arisan, Formosa, June 22, 1917 (T. Shiraki) No. 1331.

This magnificent crane-fly has hitherto been known only from the type, a fragmentary specimen in the collection of the British Museum that from its size is judged to be a male. The female sex may now be described and additional details of color and structure indicated.

Allotype, ♀. Very similar to the description of the type. Rostrum and palpi dark brown. Antennæ moderately long for a member of this genus, dark brown, the apices of the flagellar segments indistinctly paler. Head greenish yellow. The supernumerary cross-veins of the wings are surrounded by conspicuous brown seams, the one in cell R_3 lying just proximad of *r*, the one in cell R_5 being almost in alignment with the outer deflection of M_3; *r* at the tip of R_1. The wing-markings described by Edwards as being black are here of a medium brown. Abdomen brownish testaceus, sternites paler, especially basally; a narrow, dark brown lateral stripe on either side. Ovipositor as in the genus, the tergal valves comparatively small and strongly upcurved, the longer sternal valves almost straight, but slender.

Female. Length 12.8 mm.; wing, 17.8 mm.

Allotype, ♀, Arisan, Formosa, June 22, 1917.

Limnobia Meigen.

Limnobia atridorsum sp. n.

General coloration of the mesonotum shiny black; pleura yellowish, marked with black; wings brownish yellow, the cord indistinctly seamed with darker; abdominal tergites dark brown, sternites yellow, ringed caudally with dark brown.

Female—Length 9 mm.; wing, 9.1 mm.

Rostrum black, moderately elongated; palpi black. Antennæ of moderate length, the first scapal segment brownish black; second segment pyriform, yellowish; first flagellar segment obscure yellow basally, remainder of the flagellum black; flagellar segments cylindrical, with long, black verticils. Head strongly narrowed behind the eyes, shiny brownish black, the front and anterior part of the vertex gray pruinose; a median furrow on the occiput and posterior part of the vertex.

Pronotum black medially. Mesonotal praescutum shiny black, the humeral region conspicuously obscure yellowish; remainder of the mesonotum shiny black. Propleura orange-yellow; mesepisternum and mesosternum black; remainder of the pleura greenish yellow, with a rounded dark brown spot on the lateral sclerites of the postnotum immediately before the root of the halter. Halteres pale brown, the knobs dark brown. Legs with the fore coxæ and trochanters orange-yellow; remaining coxæ and the trochanters greenish yellow; rest of the legs broken. Wings brownish yellow; stigma dark brown; cord and outer end of cell *1st* M_2 narrowly and indistinctly seamed with brown; wing-tip indistinctly darkened; veins dark brown. Venation: *Sc* long, Sc_2 at the tip of Sc_1 and at least four times as long as Sc_1 alone, about equal to *r; Rs* moderately long, angulated and slightly spurred at origin; *r* removed from the tip of R_1 to a distance between one and one-half to two times its own length; cell *1st* M_2 closed, basal deflection of Cu_1 just beyond the fork of *M;* the costa continues around the wing-margin as a delicate vein.

Abdominal tergites dark brown; sternites yellow, the posterior margins of the segments narrowly ringed with dark brown, these bands increasing in size to the apical segments, on the sub-terminal segments including the entire sternite. Ovipositor with the tergal valves long, straight, acute; sternal valves shorter.

Habitat: Formosa. Holotype, ♀, Funkiko, April 25, 1917 (T. Shiraki) No. 1335.

Limnobia atridorsum is a species that might be referred with almost equal propriety to either *Limnobia* or *Dicranomyia*. Its closest relative seems to be *L. japonica* (Alexander) of Japan.

Dicranomyia Stephens.

Dicranomyia puncticosta Brunetti.

1912. *Dicranomyia puncticosta* Brunetti; Fauna Brit. India, Diptera Nematocera, pp. 377, 378, pl. 7, fig. 7.

A small series of both sexes from Funkiko, Formosa, April 21–29, 1917 (T. Shiraki) No. 1339.

Antocha Osten Sacken.

Antocha javanensis Alexander.

1915. *Antocha javanensis* Alexander, Proc. U. S. Nat. Mus., vol. 49, p. 171, pl. 43, fig. 18.

A small series of both sexes taken at Shishito, Formosa, May 25–26, 1917 (T. Shiraki) No. 1345. The specimens agree well with the type of *A. javanensis*, although there are, in some specimens, three feebly-defined brownish stripes on the praescutum. This is presumably the species mentioned by Edwards from Horisha, Formosa (Ann. Mag. Nat. Hist., ser. 8, vol. 18, p. 249), although the species is very much smaller than the European *A. vitripennis* (Meigen). The male sex has not been described and one of the present specimens is hereby designated as allotype.

Allotype, ♂. Male hypopygium with the dorsal pleural appendage cylindrical, chitinized, the apex truncated and with a small rounded notch; ventral appendage fleshy with numerous coarse bristles.

Male—Length 4–4.1 mm.; wing, 4.3–4.5 mm.

Allotype, ♂, Shishito, Formosa, May 25, 1917.

Styringomyia Loew.

Styringomyia flavitarsis sp. n.

General coloration shiny black; legs black, the posterior tarsi obscure yellow; wings dark brown.

Male—Length, 7.8 mm.; wing, 6.1 mm.

Rostrum and palpi dark brown. Antennal scape brownish black; basal flagellar segments dark brown, the remainder brownish yellow, the segments rather elongated. Head brownish testaceous.

Thoracic dorsum entirely shiny black. Pleura dark brown. Halteres brownish black. Legs with the coxæ black; trochanters obscure yellow; femora black, obscure yellow basally, this marking most extensive on the fore legs, almost obliterated on the posterior femora; tibiæ entirely black; tarsi of the fore legs black, the metatarsi slightly paler basally; posterior tarsi dull yellow, only the last segment blackened. Wings with a strong, dark brown tinge; a faintly darker cloud on *r-m;* veins brownish black. Venation: *2nd Anal* vein not angulated or spurred.

Abdomen black.

Habitat: Formosa. Holotype, ♂, Funkiko, April 27, 1917 (T. Shiraki) No. 1351.

The only species with which this large, vigorous *Styringomyia* may be confused is *S. solocipennis* (Enderlein) of Madagascar, a much smaller fly with the legs entirely dark brown.

Styringomyia flava Brunetti.

1911. *Styringomyia flava* Brunetti, Rec. Indian Mus., vol. 6, p. 301.

Three ♂ ♀'s, Funkiko, Formosa, April 21–27, 1917 (T. Shiraki) No. 1329.

Paratropeza Schiner.

Paratropeza (Gymnastes) hyalipennis sp. n.

Generally similar to *P. ornatipennis* (de Meijere); wings hyaline, without dark crossbands.

Male—Length 4.8 mm.; wing, 5.6 mm.

Rostrum and palpi brownish black. Antennæ brownish black, the scapal segments a little brighter. Head broad, shiny blue-black.

Mesonotum deep black, the praescutum and scutum with bluish reflections, the postnotum with faint purplish reflections. Pleura black, the mesopleura faintly grey pruinose; dorso-pleural membrane dull yellow. Halteres black, the apices of the knobs pale yellow. Legs with the coxæ brownish black; trochanters yellowish brown; only the posterior pair of legs remain; femora obscure brownish yellow, the swollen tips broadly dark brown, immediately before the brown tips a narrow yellowish ring; tibiæ yellow, the tips broadly blackened; metatarsi with the basal half yellow, the distal half and the remaining tarsal segments black. Wings hyaline, only the small, rounded stigma brown; veins dark brown. Venation almost as in *P. ornatipennis; r* on R_2 near the middle of its length; basal deflection of Cu_1 at or immediately before the fork of *M*.

Abdomen blue-black.

Habitat: Formosa. Holotype, ♂, Funkiko, April 25, 1917 (T. Shiraki) No. 1354.

Paratropeza (Gymnastes) ornatipennis (de Meijere).

1911. *Gnophomyia ornatipennis* de Meijere; Tijdschr. v. Ent., vol. 54, pp. 47, 48, pl. 3, fig. 34.

Three ♂ ♀, Funkiko, Formosa, April 21–29, 1917 (T. Shiraki) No. 1338.

Paratropeza (Gymnastes) shirakii sp. n.

Black, the front and vertex white; halteres with the knobs white; femora and tibiæ black, each with two narrow white rings; metatarsi white basally; wings brown, the base and two narrow crossbands whitish hyaline; *r-m* connecting with *Rs* before its fork.

Male—Length, 4.2–4.3 mm.; wing, 5 mm.

Female—Length, 5 mm.; wing, 5 mm.

Rostrum and palpi brown. Antennæ with the first segment whitish, remainder of the antennæ dark brownish black. Front and anterior part of the vertex snowy white, the latter slightly protuberant; remainder of the head black, sparsely gray pruinose.

Thorax black. Halteres dark brown, the knobs and extreme ends of the stem whitish. Legs with the coxæ and trochanters black; femora black, a narrow ring beyond mid-length and the narrow tip white; tibiæ black, a narrow ring immediately beyond the base and a subequal ring beyond midlength white; metatarsi with the basal half white; remainder of the tarsi black; posterior femora clavate as in this group of species. Wings dark brown, the base up to the arculus, a very narrow crossband before the cord and a subequal similar band at the outer end of cell *1st* M_2 whitish hyaline; the first of these bands does not include cells *C* and *Sc*, but the outer band extends from margin to margin. Venation: *r* not with the apparent fork, as in *ornatipennis*, inserted on R_{2+3} about its own length beyond the fork; *r-m* connecting with *Rs* before its fork; basal deflection of Cu_1 at the base of the very narrow cell *1st* M_2.

Abdomen blue-black; in the female, the valves of the ovipositor are light horn-colored.

Habitat: Formosa. Holotype, ♂, Funkiko, April 21, 1917 (T. Shiraki). Collectors No. 1354. Allotopotype, ♀. Paratopotype, ♂.

This exquisite little fly is dedicated to its collector, Dr. T. Shiraki. It is most nearly related to *P. bistriatipennis* (Brunetti) of South-western India, differing in the uniformly black thorax and the very different leg-pattern.

Atarba Osten Sacken.

Atarba pallidicornis Edwards.

1916. *Atarba pallidicornis* Edwards, Ann. Mag. Nat. Hist., ser. 8, vol. 18, pp. 249, 250.

Six males and females, Funkiko, Formosa, April 21–27, 1917 (T. Shiraki) No. 1342. Only the female sex has been described. Edwards is entirely right in stating that the tibial spurs in this and the following species are lacking. This is a very strange condition, though entirely duplicated in the genus *Polymera* and in *Lecteria* (if we consider *Psaronius* Enderlein as being a spurred form of this genus). The new subgeneric name, *Atarbodes*, may be applied to the group of species with spurless tibiæ, the type of the subgenus being the present form.

Allotype, ♂. Very similar to the female. Antennæ short, with long, conspicuous verticils, longest on the basal segments of the flagellum. Abdomen with a barely indicated subterminal brown ring. Hypopygium with the outer pleural appendage densely set with appressed blackened spines; inner appendage a little longer, flattened, pale, at the apex with a few hyaline setæ.

Male.—Length 4.5–4.8 mm.; wing, 5.8–6 mm.

Allotype, ♂, Funkiko, Formosa, April 27, 1917.

Atarba fuscicornis Edwards.

1916. *Atarba fuscicornis* Edwards, Ann. Mag. Nat. Hist., ser. 8, vol. 18, p. 250.

One female, Funkiko, Formosa, April 21, 1917 (T. Shiraki) No. 1349.

Erioptera Meigen.

Erioptera alboguttata Edwards.

1916. *Erioptera* (*Erioptera*) *alboguttata* Edwards; Ann. Mag. Nat. Hist., ser. 8, vol. 18, p. 252, pl. 12, fig. 4.

One male from Funkiko, Formosa, April 29, 1917 (T. Shiraki) No. 1356. As pointed out by its describer, this interesting crane-fly bears a striking resemblance to species of the subgenus *Mesocyphona*, especially *E.* (*M.*) *dulcis* and *E.* (*M.*) *needhami*, but is a true member of *Erioptera* in the restricted sense.

Erioptera (Empeda) nigroapicalis sp. n.

Size moderately large (wing over 4 mm.); head gray; femora yellow, the tips broadly and conspicuously brownish black; wings subhyaline, veins brown; male hypopygium with the outer pleural appendage heavily chitinized, blackened.

Male.—Length 3.2 mm.; wing, 4.5 mm.

Female.—Length 4 mm.; wing, 4.7 mm.

Rostrum and palpi reddish. Antennæ with the first scapal segment grayish pruinose; second segment enlarged, black; first flagellar segment enlarged, subequal to the second scapal segment in size, black; remainder of the flagellum reddish brown; verticils of moderate length only. Head light bluish-gray.

Mesonotal praescutum obscure yellowish-brown, with three broad black stripes, the lateral stripes continued caudad onto the scutal lobes, the median stripe best indicated anteriorly; remainder of scutum dark gray pruinose; scutellum and the posterior margins of the scutal lobes obscure yellow; postnotum black, sparsely gray pruinose. Pleura yellowish, the mesopleura and lateral sclerites of the postnotum darker and faintly grayish pruinose. Halteres bright yellow. Legs with the coxæ and trochanters yellow; femora yellow, the tips broadly and conspicuously brownish black; tibiæ and metatarsi dull yellow, the tips narrowly dark brown; remainder of the tarsi dark brown; tibiæ and first two tarsal segments each with two powerful bristles close to the tip on the ventral face. Wings nearly hyaline; veins brown. Venation: *Sc* short, ending a short distance beyond the origin of *Rs; r* more than its own length beyond the fork of *Rs;* R_2 rather short, oblique; cell *1st* M_2 open by the atrophy of *m.*

Abdomen reddish brown. Male hypopygium with the pleurites produced into a small fleshy lobe; pleural appendages two in number, the outer appendage bifid, heavily blackened, the two arms almost straight, approximately subequal in length, but one much stouter than the other; inner pleural appendage a pale arm that is slightly expanded distally. Ovipositor with the tergal valves considerably longer than the sternal valves, slightly upcurved.

Habitat: Formosa. Holotype, ♂, Funkiko, April 29, 1917 (T. Shiraki) No. 1353. Allotopotype, ♀, April 21, 1917. Paratopotypes, 3 ♂'s, 1 ♀, April 21–29, 1917.

Erioptera (Empeda) minuscula sp. n.

Size very small (wing under 3.5 mm.); head gray; femora yellowish, the tips rather broadly infuscated; wings subhyaline; veins pale brown; male hypopygium with the pleural appendages not blackened.

Male.—Length 2.2 mm.; wing, 3 mm.

Female.—Length 2.8 mm.; wing, 3.3 mm.

Rostrum and palpi dark brown. Antennæ dark brown, the verticils in the male elongate. Head light gray.

Mesonotum reddish brown to dark liver-brown, deepest on the anterior part of the praescutum; lateral margins of the praescutum narrowly yellowish. Pleura reddish, sparsely gray pruinose. Halteres yellow. Legs with the coxæ reddish yellow; trochanters brownish yellow; femora obscure yellow, the tips rather broadly infuscated; tibiæ and metatarsi obscure yellow, the tips weakly infuscated; remainder of tarsi dark brown; two conspicuous bristles before the tips of the tibiæ and first two tarsal segments. Wings subhyaline; veins pale brown; stigma lacking. Venation: R_2 not conspicuously oblique; *Sc* ending about opposite one-fifth the length of *Rs*; cell *1st* M_2 open by the atrophy of *m.*

Abdomen reddish brown. Male hypopygium with the pleural appendages not blackened as in *E. nigroapicalis*, the outer appendage bifid, the caudal arm acute, the cephalic arm shorter, shaped as a flattened blade; inner pleural appendage slender, cylindrical. Ovipositor with the valves long and slender, pale, the tergal valves moderately upcurved.

Habitat: Formosa. Holotype, ♂, Shishito, May 25, 1917 (T. Shiraki) No. 1357. Allotopotype, ♀. Paratopotypes, 2 ♂'s, 1 ♀.

Molophilus Curtis.

Molophilus costalis Edwards.

1916. *Molophilus costalis* Edwards; Ann. Mag. Nat. Hist., ser. 8, vol. 18, p. 251.

One ♂, one ♀, Funkiko, Formosa, April 25–27, 1917 (T. Shiraki) No. 1355.

Allotype ♂. Very similar to the type female. Antennæ of moderate length only. Hypopygium with four conspicuous blackened spinous appendages that are almost straight; dorsal spines at their base on the inner side with a smaller, straight spine of approximately one-half the length of the larger. The ventral appendages are longer and more slender, the tips acute, the inner face before the tip with microscopic teeth.

Male—Length 3.2 mm.; wing, 4 mm.

Allotype, ♂, Funkiko, Formosa, April 27, 1917.

Gonomyia Meigen.

Gonomyia (Gonomyia) pruinosa sp. n.

General coloration of the head and thorax dark, heavily light gray pruinose; antennæ dark brown, the scapal segments pale whitish yellow; legs brownish yellow, metatarsi short; wings nearly hyaline, the stigma and small dots at the origin of *Rs* and the fork of *Cu* dark brown; cell *1st* M_2 open; basal deflection of Cu_1 far before the fork of *M*; abdomen brownish black, the tergites narrowly ringed with light yellow.

Female—Length, 5.6 mm.; wing, 5.2–5.3 mm.

Rostrum and palpi dark brown. Antennæ with the scapal segments pale whitish yellow, the flagellar segments dark brown, oval. Head pale brown, heavily light gray pruinose.

Mesonotal praescutum with four dark brown stripes, heavily light gray pruinose, more reddish in the vicinity of the conspicuous, elongate pseudosutural foveæ. Pleura and sternum reddish yellow. Halteres elongate, pale brown, the knobs more yellowish. Legs with the coxæ and trochanters reddish yellow; femora and tibiæ brownish yellow, the tips of the latter narrowly darkened; tarsi brown. Wings nearly hyaline; stigma small, oval, dark brown; a small, dark brown spot at the origin of *Rs* and another at the fork of *Cu;* veins dark brown, veins *C* and *Sc* yellowish. Venation: *Sc* rather short, ending just beyond the origin of *Rs; Rs* long, arcuated; R_3 a little shorter than *r-m;* R_{2-3} shorter than R_3; inner ends of cells R_3, R_5 and *1st* M_2 in alignment; cell *1st* M_2 open by the atrophy of the outer deflection of M_3; cell *2nd* M_2 longer than its petiole; basal deflection of Cu_1 more than its own length before the fork of *M*.

Abdomen dark brownish black, the tergites narrowly ringed caudally with light yellow, the lateral margins more broadly but obscurely yellow. Ovipositor with the tergal valves long and slender, gently upcurved.

Habitat: Formosa. Holotype, ♀, Shishito, May 26, 1917 (T. Shiraki) No. 1346. Paratopotype, ♀.

Gnophomyia Osten Sacken.

Gnophomyia (Dasymallomyia) signata (Brunetti).

1911. *Dasymallomyia signata* Brunetti; Rec. Indian Mus., vol. 6, p. 304.

One female, Funkiko, Formosa, April 25, 1917 (T. Shiraki) No. 1329. It is with deference to the views of Brunetti and Edwards that the name *Dasymallomyia* is here retained as a subgenus. In the opinion of the writer, the group rests on a very slim basis.

Limnophila Macquart.

Limnophila (Dicranophragma) formosa sp. n.

Close to *L. pulchripennis;* wings with a brown cross-banded pattern, including seven costal blotches, the third and fourth united into a V-shaped marking that continues caudad along the cord; a seam on *r* that continues to vein R_3.

Male—Length 4.8–5 mm.; wing, 6.3 mm.

Closely related to *L. pulchripennis* (Brunetti) of India (Fauna British India, Diptera Nematocera, pp. 524, 525; 1912), but differing in the details of coloration.

Rostrum and palpi brown. Antennal scape brown; flagellum light yellow, only the distal segments more testaceous. Head gary, yellowish pollinose.

Mesonotal praescutum pale, heavily yellowish pollinose, the remainder of the mesonotum more brownish. Pleura and sternum brown, light gray pruinose. Halteres yellow. Legs with the coxae brown; trochanters obscure yellow; remainder of the legs yellow, the terminal tarsal segments brown. Wings yellowish subhyaline, with a cross-banded brown pattern; the more conspicuous markings along costa are as follows: A broad stripe near the wing-base, attaining vein *Cu*; a similar stripe at the origin of *Rs*, reaching *M;* a V-shaped mark, the proximal arm at Sc_2, the distal arm beyond the tip of R_1 continued proximad along R_{2+3}, uniting with the proximal arm at the fork of Rs and thence continued caudad as a broad seam along the cord; the distal arm is united along R_1 with a mark that surrounds r and continues caudad to vein R_3; a band at the level of the supernumerary cross-vein in cell R_2, extends from costa to the caudal margin of the wing at the end of vein M_3, paler and less distinct in the posterior cells; pale brown clouds at the ends of all the longitudinal veins; a brown seam along the outer end of cell *1st* M_2; a distinct grayish tinge in cells M and Cu beyond the base; two or three small brown dots in cell *2nd* A at the wing-margin.

Abdomen obscure yellow, the tergites margined laterally and posteriorly with dark brown. Hypopygium light brown.

Habitat: Formosa. Holotype, ♂, Funkiko, April 21, 1917 (T. Shiraki) No. 1341. Paratopotypes, 2♂'s, April 21-29, 1917.

Eriocera Macquart.

Eriocera sauteriana Enderlein.

1912. *Eriocera sauteriana* Enderlein; Zool. Jahrb., Syst., vol. 32, pt. 1, pp. 42, 43, fig. Y.

One male, Kanshirec, Formosa, June 15, 1917 (T. Shiraki) No. 1319.

Eriocera lygropis sp. n.

Size large (wing of male 19 mm. or over); general coloration deep velvety black; wings dark brownish black; cell M_1 present; abdomen with the bases of the segments shiny steel blue.

Male—Length 19 mm.; wing, 19-19.5 mm.

Rostrum and palpi dark brownish black. Antennæ short, dark brown. Head black, the front and anterior portion of the vertex sparsely gray pruinose; vertical tubercle conspicuous, directed cephalad.

Mesonotal praescutum velvety black with four shiny blackish stripes, the intermediate pair narrowly separated; lateral margins of the sclerites more brownish; remainder of the thorax deep black. Halteres short, black. Legs entirely deep black. Wings dark brownish black, more saturated along the costal margin, paler in the centers of the posterior and anal cells; veins brown. Venation: Sc_1 ending opposite r; Sc_1 alone longer than R_{2+3}; r far from the tip of R_1 and at about one-third the length of R_2; R_{2+3} a little longer than the deflection of R_{4+5}, the latter in alignment with the distal section of this vein; petiole of cell M_1 but little shorter than the fork; cell *1st* M_2 about as long as the petiole of cell M_1; basal deflection of Cu_1 near mid-length of cell *1st* M_2.

Abdomen deep velvety black, the base of each segment shiny steel-blue, broadest on segment two, those on the posterior segments becoming narrowed, on the sixth and seventh segments occupying the basal third of the segment or less.

Habitat: Formosa. Holotype, ♂, Koshun, April 25-May 25, 1918 (J. Sonan, K. Miyake, M. Yoshino). Paratopotype, ♂; homotypes, 3 specimens in the collection of the British Museum.

Eriocera lygropis (Greek, "gloomy") is closely allied to *E. unicolor* de Meijere, of Sumatra and was determined as such by Edwards in his report on Formosan Tipulidæ (Annals and Magazine of Natural History, ser. 8, vol. 18, p. 253; 1916). Subsequently Mr. Edwards and the writer have come to doubt that the two species are identical and specimens from the British Museum were sent to Dr. de Meijere by Mr. Edwards for comparison with the type of *unicolor*. Dr. de Meijere reports as follows: "The most conspicuous difference is that in your species there are broad shining bands on the abdomen, while in mine the abdomen is practically wholly dull black. The thorax of my species is more shining, on the part before the suture there are only three thin dull lines and also the hinder part is more shining. Your species is somewhat larger and the wings are broader, the end of *Rs* is nearer the wing-apex, the fork of R_{2+3} and the discoidal cell are somewhat shorter, the latter more quadrate." I would express my indebtedness to Mr. Edwards and Dr. de Meijere for thus clearing the identity of this large and conspicuous crane-fly.

Tricyphona Zetterstedt.

Tricyphona formosana sp. n.

General coloration light brown; legs pale brownish testaceous; wings subhyaline; vein R_2 long, oblique in position; cell *1st* M_2 open.

Male—Length about 4 mm.; wing, 5.8 mm.

Rostrum reddish brown; palpi brownish black. Antennæ comparatively short, dark brown, the first scapal segment obscure brownish yellow; flagellar segments oval. Head light brown, sparsely pruinose.

Mesonotal praescutum light brown, indistinctly transversely irrorate with short brown lines, sparsely pruinose; remainder of the mesonotum concolorous, the caudal margin of the postnotum darkened. Pleura obscure yellowish. Halteres pale brownish white. Legs with the coxæ yellow; trochanters testaceous; remainder of the legs pale brownish testaceous, the outer tarsal segments darkened. Wings subhyaline, the region of the stigma faintly darkened; veins pale brown. Venation: The free portion of R_2 equal to $R_1 + R_2$, oblique in position, somewhat resembling the condition found in *T. protea* Alex.; *r-m* inserted at about mid-length of R_{4+5}; cell *1st* M_2 open by the atrophy of *m;* cell M_1 present; basal deflection of Cu_1 inserted on M_3 about one-half its own length beyond the fork of *M*.

Abdomen light brown, the first tergite darker medially; segments five and six somewhat darker colored.

Habitat: Formosa. Holotype, ♂, Arisan, April 24, 1917 (T. Shiraki) No. 1348.

Dictenidia Brullé.

Dictenidia formosana sp. n.

General coloration yellow, the mesonotum shiny black; posterior legs larger than the others, the tibia with a brown ring before mid-length and with the tips broadly dark brown; wings yellowish, the apex narrowly dark brown.

Male—Length about 11.5 mm.; wing, 11.6 mm.

Frontal prolongation of head and palpi yellow. Antennæ with the scapal segments yellow, the flagellum brown, the segments indistinctly darker basally. Head light yellow; vertex obscure yellow with a T-shaped black mark, the arms of the T passing to the eyes, the stem continued caudad on to the occiput.

Mesonotum obscure brownish yellow, the praescutum and scutal lobes shiny black. Pleura yellow. Halteres yellow, the knobs brown. Legs with the coxæ and trochanters yellow; fore and middle legs light yellowish brown, the tarsi darker; posterior legs much longer and stouter, the tibiæ yellow with a broad, dark brown ring before mid-length and with the tips rather broadly brownish black; tarsi brownish black. Wings with a strong yellowish tinge, deepest basally and in the costal region, more grayish in the posterior and anal cells; wing-tip brown, this occupying the ends of cells R_2 to M_1; stigma rather small, sub-rectangular, dark brown; a faint dark seam along the cord, most evident on the basal deflection of R_{4+5}, *r-m* and the basal deflection of Cu_1; veins dark brown; numerous macrotrichiæ in the apices of cells R_3 to M_1, confined to the central portions of the cells.

Abdomen obscure yellow, the tergites with an interrupted dorso-median stripe; segments eight and nine shiny black. Hypopygium cylindrical, not conspicuously enlarged.

Habitat: Formosa. Holotype, ♂, Funkiko, April 25, 1917 (T. Shiraki) No. 1329.

Dictenidia formosana is much more nearly allied to the genotype, *D. bimaculata* (Linnæus) of Europe than to *D. fasciata* Coquillett of Japan. It is readily told from *bimaculata* by the coloration of the posterior legs and the great reduction in the size of the dark band along the cord of the wing. Mr. Edwards informs me that *D. horikawæ* Matsumura is a *Pselliophora* rather than a *Dictenidia*. None of the dozen species of the former genus known to the writer possesses macrotrichiæ in the apical cells of the wing, a condition that is well defined in all three species of *Dictenidia*, least extensive in *D. bimaculata*, where it is confined to cell R_5, most extensive in *D. fasciata* where macrotrichiæ are found in cells R_2, R_3, R_5 and M_1.

Pselliophora Osten Sacken.

Pselliophora ctenophorina Riedel.

1913. *Pselliophora ctenophorina* Riedel; Entomol. Mitteilungen, vol. 2, pp. 274-276.

One male from Taito, Formosa, February 25–March 27, 1919 (S. Inamura, J. Sonan and M. Yoshino) No. 1318.

One female from the type-locality (Koshun), April 25–May 25, 1918 (J. Sonan, K. Miyake and M. Yoshino).

In the male the last segment of the palpus is yellowish white, passing into dark brown at the narrow apex; in the female, however, the terminal palpal segment is entirely black, the third black with the extreme base and apex pale. In the male, the centers of the wing-cells are but slightly paler than the obscure blackish ground-color; in the female the centers of cells *M*, R_5, M_1, *2nd* M_2, M_4, *Cu*, Cu_1, *1st A* and *2nd A* are whitish hyaline.

Pselliophora scalator sp. n.

Closely related to *P. laprobanes* (Walker); thoracic pleura yellow; wings yellow with dark brown markings; abdomen with a dark brown median stripe, the posterior margins of the segments narrowly blackened.

Male—Length 17 mm.; wing, 15.8 mm.

Female—Length 20 mm.; wing, 17.5 mm.

Frontal prolongation of the head very short, yellow; palpi with the basal three segments yellow, the terminal segment dark brown at either end, paler brown medially. Antennæ of the male with the first segment obscure yellow, darker above; remaining segments bicolorous, the basal two-thirds of each segment and the pectinations black, the apical third yellow. In the female, the simple antenna is almost uniformly brown throughout. Head yellow, clothed with long, black hairs.

Pronotum yellow, the sides of the scutum narrowly margined with dark brownish black behind. Mesonotal praescutum yellow, with three conspicuous, dark brown stripes, the lateral stripes continued across the suture and re-appearing as conspicuous marks on the scutal lobes; remainder of the mesonotum yellow, the median areas of both scutellum and postnotum indistinctly darkened. Pleura yellow. Halteres brownish yellow, the knobs dark brown on the basal half. Legs with the coxæ orange-yellow; trochanters yellow; femora brownish yellow, the posterior femora narrowly tipped with black; tibiæ brown, the posterior tibiæ darker brown, with a broad, pale yellow ring just beyond the base; tarsi dark brown. Wings yellowish, variegated with dark brown; the wing-tip beyond the cord is dark brown, in the male, the centers of cells

R_2, R_3, R_5, M_1 and *2nd* M_2 indistinctly paler; a broken X-shaped crossband of brown before the cord extending from the subcostal cell to the posterior margin of the wing; the amount of yellow in cell *R* enclosed between the upper arms of the X is variable, more extensive in the female, very restricted in the male; the posterior arms of the X enclose a solid area in both sexes; cells *1st A* and *2nd A* are largely brown, this appearing as a broad seam on vein *2nd* A and along the posterior margin of cell *2nd A*, most intense in the extreme anal angle; in the end of cell *R*, the yellow ground-color is much paler, nearly hyaline; veins dark brown. Venation: Cell M_1 sessile.

Abdominal tergites yellow, with a broad, conspicuous, dark brown median stripe that is narrowly interrupted at the anterior margin of each segment, at the posterior margin uniting with a narrow, black, posterior border; last segment brownish black; sternites similar, but the median stripe is reduced to a series of linear dashes. Ovipositor with the basal sclerite jet-black; valves slender, deep horn-colored.

Habitat: Formosa. Holotype, ♂, Taito, February 25-March 27, 1919 (S. Inamura, J. Sonan and M. Yoshino) No. 1320.Allotype, ♀, Shinchiku, July 1-30, 1918 (J. Sonan and K. Miyake).

This is presumably the species reported from the island as *Pselliophora taprobanes* (Walker) by Riedel (Arch. für Naturgeschichte, Abt. A, vol. 5, p. 115; 1917; Ann. Musei Nat. Hungarici, vol. 16, p. 320; 1918).

Brithura Edwards.

Brithura conifrons Edwards.

1916. *Brithura conifrons* Edwards, Ann. Mag. Nat. Hist., ser. 8, vol. 18, pp. 263, 264.

One female, taken at Arisan, Formosa, October 2-23, 1918 (J. Sonan and M. Yoshino) No. 1334.

Up to the present date, only the male sex of members of this curious genus have been discovered. The female of *B. conifrons* is hereby designated as allotype and may be further discussed as follows:

Allotype, ♀. Very similar to the description of the male. The vertical cone is very conspicuous as in the male. The second scapal segment is conspicuously brighter-colored than the first, yellowish. Praescutal interspaces with an abundant erect pubescence. Abdomen dark brown; eighth and ninth segments rufous. Ovipositor orange-yellow, the tergal valves almost straight, acute; sternal valves shorter, straight, a little higher than the tergal valves.

Female—Length about 25 mm.; wing, 20 mm.; abdomen, 15.4 mm.; Fore leg, femur, 9 mm.; tibia, 10.5 mm.; metatarsus, 6.2 mm.; Middle leg, femur, 10 mm.; tibia, 9.6 mm.; metatarsus, 8 mm.; Hind leg, femur, 11.5 mm.; tibia, 12.3 mm.; metatarsus, 10 mm.

Allotype, ♀, Arisan, Formosa, October 2–23, 1918.

Tipula Linnæus.

Tipula holoserica (Matsumura).

1916 (July). *Formotipula holoserica* Matsumura, Thousand Insects Japan, Add. 2, pp. 456, 457.

1916 (September). *Tipula rufomedia* Edwards, Ann. Mag. Nat. Hist., ser. 8, vol. 18, pp. 259, 260.

1917. *Tipula nigrorubra* Riedel, Arch. für Naturgeschichte, Abt. A, vol. 5, pp. 115, 116.

One male from Edwards' type-locality, Horisha, 1916, No. 1332. One male, Shinchiku, Formosa, July 1–30, 1918 (J. Sonan and K. Miyake). Riedel describes the legs of his species as being "powerful," but in spite of this discrepancy, there can be no reasonable doubt of the synonymy.

Tipula shirakii Edwards.

1916. *Tipula shirakii* Edwards, Ann. Mag. Nat. Hist., ser. 8, vol. 18, pp. 258, 259.

Six ♂ ♀, Funkiko, Formosa, April 21–27, 1917 (T. Shiraki) No. 1327. This series of specimens agrees well with Edwards' characterization of the type. The additional details of structure of the hitherto unknown male may be given.

Allotype, ♂. Very similar to the female, differing only in the sexual characters. The antennæ are short. Hypopygium with the ninth tergite large, nearly quadrate, with a conspicuous, flattened median lobe that is deeply notched medially, the lateral lobules thus formed being compressed blades that are covered with abundant black spicules. Outer pleural appendage large, flattened, broad basally, gradually narrowed to the rounded apex, pale yellowish white and very conspicuous. From the ventral-caudal angle of the ninth pleurite, close to the ninth sternite, two conical appendages hang in the notch of the ninth sternite, these provided with a pencil of long, reddish bristles at their tips. Ninth sternite strongly carinate. Eighth sternite somewhat projecting, the median area unarmed, on either side of the median area with a dense fringe of moderately long silvery bristles.

Male—Length 17–18 mm.; wing, 20–24 mm.

Allotype, ♂, Funkiko, Formosa, April 21, 1917.

Tipula tridentata sp. n.

Head gray; pronotum cream-colored, with a dark brown median line; mesonotal praescutum obscure brownish black, sparsely pruinose; wings strongly brownish yellow, the anal cells slightly paler; abdomen brownish yellow, with three black longitudinal stripes; male hypopygium with the ninth tergite tridentate, with an acute median tooth and more blunt lateral lobes; eighth sternite with three tufts of yellowish setæ.

Male—Length 11.5 mm.; wing, 14.2 mm.

Frontal prolongation of the head dark gray above, brownish yellow beneath, these two colors divided by a narrow dark brown line; palpi dark brown. Antennæ moderately elongated, the long first scapal segment dark brown, indistinctly reddish at the tip; second scapal segment reddish brown; flagellum dark brownish black, with a heavy white pubescence; flagellar segments with the basal enlargement moderately prominent, verticils conspicuous. Head light gray.

Pronotum cream colored with a delicate, dark brown, median line. Mesonotal praescutum obscure brownish black, sparsely pruinose, without distinct stripes, the margins of the sclerite more brownish; scutal lobes black, sparsely pruinose; scutellum reddish brown, the median sclerite with a delicate, dark brown, median line; postnotum gray, whitish gray pruinose. Pleura pale brown, sparsely gray pruinose. Halteres rather long, light yellow, the knobs brown. Legs with the coxæ light yellow, with a faint gray bloom; trochanters dull yellow; fore femora brown, more yellowish basally; posterior femora brownish yellow, with a narrow, dark brown ring before the tip; tibiæ brown, the tips dark brown; tarsi dark brown. Wings with a strong, brownish yellow tinge that is slightly paler in the anal cells; stigma slightly darker brown; a small obliterative area before the stigma in cell *1st* R_1 and another extending from the end of cell *R* across cell *1st* M_2 into the base of cell M_4; veins dark brown; three or four macrotrichiæ in cell R_5 near its distal end. Venation: *Rs* about twice the length of R_{2+3}; basal section of R_2 nearly perpendicular to the end of R_{2+3}; cell *1st* M_2 small, pentagonal; petiole of cell M_1 about one-half the length of the cell; *m-cu* present.

Abdomen brownish yellow, the tergites with three conspicuous black longitudinal stripes; sternites and hypopygium pale brownish yellow. Male hypopygium with the ninth tergite extensive, the caudal margin produced into two, bluntly rounded, lateral lobes and an acute median tooth that is carinate on its ventral surface; margins of all three lobes heavily blackened. Ninth pleurite complete; outer pleural appendage slender, elongate, slightly flattened, broadest at about mid-length, the distal two-thirds provided with long, coarse, black setæ; inner pleural appendage complex, the posterior margin at the base produced into a cylindrical lobe that tapers to the subacute apex and is clothed with long setæ. Ninth sternite with a comparatively shallow notch, from between which project the small, curved, black apophyses. Eighth sternite rather projecting, the caudal margin trilobed, a rounded median lobe that bears a flattened fringe of yellow hairs and two nearly similar lateral lobes that bear pencils of long, yellow hairs, these pencils directed across the median line so as to lie almost in a straight line or very broadly decussate.

Habitat: Formosa. Holotype, ♂, Musha, May 18–June 15, 1919 (T. Okuni, J. Sonan, K. Miyake and M. Yoshino).

Tipula subapterogyne sp. n.

Belongs to the *arctica* group; allied to *T. serricauda* Alexander; praescutal stripes brownish black, much darker than the markings on the remainder of the mesonotum; wings of the female semi-atrophied.

Male—Length, 15.5 mm.; wing, 21.2–21.5 mm.

Female—Length about 20 mm.; wing, 6.8 mm.

Frontal prolongation of the head gray, more reddish laterally; nasus very long and slender; palpi brownish black, rather short. Antennæ with the basal segment reddish, gray pruinose; second segment light yellow; flagellum black; antennæ of the male of moderate length. Head yellowish gray, more rufous adjoining the inner margins of the eyes; a narrow, dark brown median line.

Mesonotal praescutum light gray with three dark brownish black stripes; remainder of the mesonotum gray, each scutal lobe marked with dark brown, the scutellum and postnotum with a capillary brownish black median line. Pleura yellowish gray, indistinctly blotched with darker. Halteres light brown, the knobs with the basal half dark brown, the apical half yellowish. Legs with the coxæ grayish yellow; trochanters yellow; femora brownish yellow, the tips broadly black; tibiæ brown, the tips black; tarsi dark brown. Wings subhyaline, the costal and subcostal cells more yellowish; wings marmorate with dark and light brown; dark brown areas at the wing-base in cells *R* and *M*, at the origin of *Rs*, at the stigma and thence along the cord to cell *1st* M_2; the light brown areas include the broad wing-apex and extensive clouds in cells *R*, *M*, most of Cu_1, the ends of *Cu*, *1st* A and *2nd* A; the subhyaline areas appear as a broad, oblique crossband beyond the stigma, extending from cell *2nd* R_1 across the inner ends of cells R_2, R_3, R_5, through *1st* M_2 into the base of cell M_4; a large area near the bases of cells *R* and *M;* another beyond midlength of *M;* another before the stigma in cells *1st* R_1 and *R;* other subhyaline areas in cells *Cu* and *1st A;* cell *2nd A* largely subhyaline; veins dark brown. Venation: Cell R_2 large; vein R_2 beyond *r* longer than R_{2+3}; *Rs* long, about equal to R_3; petiole of cell M_1 shorter than *m*; *m-cu* punctiform or obliterated. In the female, the wings are considerably atrophied and the venation correspondingly distorted; the wings are dark brown, paler basally and along the costal region.

Abdominal tergites yellowish with three conspicuous dark brown stripes; segments six to nine more uniformly brownish; hypopygium indistinctly more reddish brown; sternites yellow, with a conspicuous median brown stripe. Male hypopygium relatively small. Eighth tergite reduced to a mere strip at the median line. Ninth tergite small, not chitinized, with a broad, deep, U-shaped median notch. Ninth pleurite complete; outer pleural appendage narrow basally, expanded and darkened outwardly; inner pleural appendage large and very compressed. Ninth sternite not notched medially, the caudal margin being almost straight across, the median area provided with a small, cushion-like lobe. Eighth sternite unarmed. Ovipositor of the *arctica* type, the intermediate lateral teeth of the tergal valves moderately acute.

Habitat: Formosa. Holotype, ♂, Noko, May 11, 1919 (T. Shiraki) No. 1324. Allotopotype, ♀. Paratopotype, ♂.

Tipula bicornuta sp. n.

Antennæ of the male moderately elongated, indistinctly bicolorous; mesonotum gray, the praescutum with four indistinct greenish brown stripes; scutellum and postnotum with a capillary brown line; wings subhyaline with a rather pale grayish marmorate pattern; abdomen yellowish, dark brown apically; male hypopygium with the pleurites produced into cylindrical, black, curved horns.

Male—Length, 11 mm.; wing, 13 mm.; antenna about 5.2 mm.

Frontal prolongation of the head buffy; palpi brown. Antennæ of the male rather elongated, nearly half the length of the body; scape and first flagellar segment yellow, the remaining flagellar segments black basally, dark brown distally, to produce an indistinct bicolorous appearance; verticils very long, approximately as long as the segments that bear them. Head buffy with an indistinct capillary brown median line.

Mesonotal praescutum light gray, with four obscure greenish brown stripes, the intermediate pair contiguous anteriorly, soon bent outwards to leave a linear strip of the ground color between them; remainder of the mesonotum light gray, with a capillary brown median line, the scutal lobes with greenish brown centers. Pleura yellowish, sparsely white pruinose. Halteres light brown, the knobs dark brown, slightly paler at the tips. Legs with the coxæ pale, whitish pruinose; trochanters yellowish; femora brown, the tips broadly dark brown; tibiæ and tarsi dark brown. Wings subhyaline, the base and costal region yellowish; stigma brown; a weak gray clouding in the cells, including the wing-apex; clouds near midlength of cells *R* and *M*, and in the ends of cells *Cu*, *1st A* and *2nd A;* the subhyaline areas include an oblique band beyond the stigma, passing from the outer end of cell *2nd* R_1 across the bases of cells R_2, R_3 and R_5, through *1st* M_2 into the base of cell M_4; veins dark brown. Venation: Cell R_2 large, vein R_2 being longer than R_{2+3}; *Rs* shorter than R_3; petiole of cell M_1 shorter than *m; m-cu* obliterated by the fusion of Cu_1 on M_{3+4}.

Abdomen yellow basally, with an indistinct dorsal stripe; segments five to nine dark brown. Male hypopygium with the ninth tergite narrow, the caudal margin heavily chitinized and with a broad U-shaped median notch and smaller lateral notches, separated by conspicuous blackened teeth. Ninth pleurite complete, the outer angle produced into a conspicuous, black, curved horn that is directed dorsad and slightly proximad. Ninth sternite with only a slight median notch, bearing a small lobe. Eighth sternite unarmed.

Habitat: Formosa. Holotype, ♂, Funkiko, April 21, 1917 (T. Shiraki), No. 1329.

Tipula formosicola sp. n.

Generally similar to *Tipula nova* Walker; head brown, paler adjoining the eyes; antennæ indistinctly bicolorous; wings dark brown, more grayish posteriorly, with a hyaline cross-band beyond the stigma, extending to beyond cell *1st* M_2; cell R_5 entirely clear; cell M hyaline with a large brown area near midlength and another at the outer end; abdomen rather long and slender; ovipositor with the valves slender, smooth.

Female—Length, 25 mm.; wing, 19 mm.; abdomen alone, 21 mm.

Frontal prolongation of the head and palpi dark brown. Antennæ with the first scapal segment grayish pruinose; second segment pale; flagellar segments yellowish, slightly darker basally, to produce a bicolorous effect. Head dark brown, paler on the vertical tubercle and adjoining the inner margin of the eyes.

Mesonotal praescutum buffy, with three dull brown stripes that are confluent, except behind near the suture; humeral region pale; a slightly darker, capillary median line that extends to the anterior margin of the praescutum; scutum buffy, each lobe with three brown spots; scutellum and postnotum grayish, the median area extensive, brown. Pleura grayish pruinose. Halteres comparatively long and slender, dark brown, the base of the stem abruptly and conspicuously yellowish. Legs with the coxæ light brown, light gray pruinose; trochanters yellowish, faintly gray pruinose; remainder of the legs broken. Wings dark brown, variegated with subhyaline, the anal cells light gray; the dark brown areas include the broad costal margin, extending caudad almost to M and reaching the still darker brown stigma which completely fills cell *2nd* R_1 and the outer half of *1st* R_1; wing-tip in the outer half of cells R_2 and R_3 dark brown; the subhyaline areas appear as a broad, transverse band beyond the stigma, occupying the basal half of cells R_2 and R_3, all of R_5, *1st* M_2 and the bases of M_1, *2nd* M_2 and M_4; these posterior cells are pale gray, only slightly darker than their subhyaline bases, but the color deepens in the anal cells of the wing; cell M is subhyaline with the apex and a cloud near midlength brownish; veins dark brown, those beyond the cord narrowly seamed with dark brown. Venation: Rs much longer than R_{2+3}; r shorter than R_2 beyond it; petiole of cell M_1 a little longer than m; m-cu distinct.

Abdominal tergites grayish, with a brown median stripe, the caudal margins of the segments paler. Abdomen comparatively long and slender. Ovipositor with the tergal valves slender, smooth; sternal valves compressed, slightly shorter than the tergal valves.

Habitat: Formosa. Holotype, ♀, Koshun, April 25–May 25, 1918 (J. Sonan, K. Miyake and M. Yoshino), No. 1323.

Tipula nova Walker.

1848. *Tipula nova* Walker; List Diptera British Museum, Part 1, p. 71.
1911. *Tipula fumifasciata* Brunetti; Rec. Indian Museum, vol. 6, p. 250.
1916. *Yamatotipula nohiræ* Matsumura; Thousand Ins. Japan, Addit. 2, p. 461.

One male, Taito, Formosa, February 25–March 27, 1919 (S. Inamura, J. Sonan, and M. Yoshino), No. 1323. The synonomy of *T. nohiræ* with *T. nova* is due to a communication from Mr. Edwards.

Tipula pluriguttata sp. n.

Antennal scape yellow; head and thorax gray with a capillary brown median line extending from the vertical tubercle to the base of the abdomen; wings yellowish gray, the base and the costal region more yellowish; cell R_2 small; abdomen yellow, the tergites with three dark brown stripes, the sternum with a conspicuous median stripe.

Female—Length, 16–17 mm.; wing, 15.5–17 mm.

Frontal prolongation of the head dark brown, more yellowish laterally; palpi dark brown. Antennæ with the basal four or five segments yellowish, the remaining segments indistinctly bicolorous; in some specimens, only the scape is yellow, the flagellar segments being almost uniformly dark. Head dull gray with a capillary brown line.

Mesonotal praescutum dull gray, more buffy laterally, the three usual stripes darker gray, the interspaces but little paler; median praescutal stripe split by a capillary brown line that broadens out at the scutum, extending thence to the abdomen; praescutal interspaces with numerous dark brown dots surrounding setigerous punctures; scutum gray, the median area brown, the lobes bilineate with brown; scutellum with the median area buffy, dark brown medially; postnotum obscure gray, the median line brown. Pleura buffy, sparsely pruinose. Halteres brownish yellow. Legs with the coxæ and trochanters buffy yellow; femora obscure yellow, with a comparatively narrow dark brown ring before the narrow tips; tibiæ obscure yellow, the tips narrowly dark brown; tarsi dark brown. Wings faintly yellowish gray, the wing-base strongly yellow, cells *C* and *Sc* yellow; stigma elongate, brown; a narrow brownish seam along *Cu;* veins dark brown. Venation: *Rs* long, straight, lying close to *R;* R_{2+3} in alignment with R_3; cell R_2 very small, the apex of vein R_2 pale, subatrophied, without macrotrichiæ; *r* very long, much longer than R_2 beyond it, provided with about thirteen macrotrichiæ; cell *1st* M_2 pentagonal; cell M_1 deep, its petiole about as long as cell *1st* M_2 and between two and three times as long as *m; m-cu* very short.

Abdomen yellowish, the tergites with three longitudinal stripes, the median stripe broad and very conspicuous; sternites with a conspicuous dark brown median line. Ovipositor with the tergal valves slender, almost straight; sternal valves much shorter, compressed.

Habitat: Formosa. Holotype, ♀, Funkiko, April 25, 1917 (T. Shiraki), No. 1326. Paratopotypes, 5 ♀'s, April 21-25, 1917.

THE MYRIOPOD FAUNA OF THE BERMUDA ISLANDS, WITH NOTES ON VARIATION IN SCUTIGERA.

Ralph V. Chamberlin.

The present paper is based upon a study of several lots of chilopods and diplopods from the Bermudas, belonging chiefly to the Museum of Comparative Zoology, at Cambridge, Mass., and to the United States National Museum, at Washington, D. C. The collections embrace material secured by Prof. J. H. Comstock, in 1903, the Yale Expedition to the Bermudas in 1898, Prof. A. E. Verrill in 1901, Mr. Owen Bryant and Dr. Thomas Barbour in 1903, Dr. R. W. Glaser, Dr. G. B. Goode, and material from the Bermuda Biological Station for Research collected by Prof. E. L. Mark in 1903, and Dr. W. L. Crozier in 1917 and 1918. An examination of this material has brought to light all species previously recorded and six species not previously known to occur upon the islands, bringing the total of chilopods and diplopods together to fifteen species. These forms are as follows:

DIPLOPODA.

Julus moreleti Lucas.
Julus bermudanus, sp. nov.
Julus nesophilus, sp. nov.
Rhinocricus monilicornis (Porath).
Rhinocricus ectus, sp. nov.
Microspirobolus excursans, sp. nov.
Orthomorpha coarctata (Saussure).
Strongylosoma guerinii (Gervais).

CHILOPODA.

Scolopendra subspinipes Leach.
Mecistocephalus maxillaris Gervais.
Hydroschendyla submarina (Grube).
Lamyctinus cæculus (Brolemann).
Lithobius provocator (Pocock).
Tidabius navigans (Chamberlin).
Scutigera coleoptrata (Linné).

Of these species three of the chilopods and one of the diplopods occur in the warmer parts of the entire world, these tropicopolitan forms being *Orthomorpha coarctata*, *Scolopendra subspinipes*, *Mecistocephalus maxillaris*, and *Lamyctinus caeculus*. Of the remaining species it is rather surprising to find that only one, namely *Rhinocricus monilicornis*, occurs also in the West Indies, though it is quite possible that the other Rhinocricus and the Microspirobolus may with further exploration be found there, the present evidence being, however, that they are indigenous. In fact, four out of the six genera represented by the remaining species—Lithobius, Tidabius, Hydroschendyla and Julus—do not occur in the West Indies, and the presence of Scutigera in the restricted sense is doubtful. The other genus, Strongylosoma, is tropicopolitan.

Of the species found upon the Bermudas, four occur also in southwestern Europe, inclusive of the Azores, these being *Julus moreleti*, *Strongylosoma guerinii*, *Hydroschendyla submarina* and *Scutigera coleoptrata*. The Scutigera appears also to be the same species as the common North American form. In addition, there is in North America a widespread species, *Tidabius tivius* Chamb., which is exceedingly close to and perhaps only varietally distinct from the Bermudan *Tidabius navigans*. Omitting this form, there remain five species apparently indigenous, two of which have West Indian affinities and the others of which must have had European or North American ancestry, but most probably the former. Omitting the four tropicopolitan species, eight of the eleven remaining species are in their affinities European and North American, the other three West Indian.

DIPLOPODA.

JULIDÆ.

Julus moreleti Lucas.

In Arthur Morelet's Iles Açores, Paris, 1860, p. 96.

Julus moreleti Porath, Öfvers, af Vet. Akad. Förh., 1870, 27, p. 820, pl. 10, figs. 9, 10.
Julus moreleti Bollman, Proc. Acad. Sci. Phil., 1889, p. 128.
Julus moreleti Pocock, Ann. and Mag. Nat. Hist., 1893, ser. 6, 11, p. 123.
Julus moreleti Chamberlin, Proc. Acad. Sci. Phil., 1904, p. 653.

This species was originally described from the Azores. It is also found in the Madeira Islands. It is abundant on the Bermudas.

Localities: Bermuda (O. Bryant, 1903; J. H. Comstock, 1893; Wm. W. Barbour, A. E. Verrill, 1901; Yale Exped.,1898); Flatts Inlet (O. Bryant, 25 June, 1903); Harrington Sound, (Bermuda Biol. Sta., R. W. Glaser); Paynter's Vale (Bermuda Biol. Sta., E. L. Mark, April, 1903); Tucker's Id. (A. E. Verrill, 3 May, 1901); Point Shares (Bermuda Biological Station for Research, W. L. Crozier coll., 5 Oct., 1917).

Julus bermudanus sp. nov. (Figs. 1 and 2).

Light brown, with a tendency toward light chestnut. Lacking a middorsal dark line and also dark lines along the sides in the types, or some of the repugnatorial glands showing weakly as darker spots. On each somite a darker transverse band across dorsum in front of suture, on dorsum in front of suture an included narrower band of lighter spots separated by a network of dark lines; a similar areolation below each repugnatorial pore. Collum with a dark band across anterior border, this narrowing down each side; plate elsewhere with network of fine dark lines over paler ground. Anal tergite and valves dusky. A darker band over and between eyes.

Vertex of head lacking setigerous foveolæ; crossed by a fine but distinct sulcus. Each eye consisting of twenty to twenty-two ocelli in five series: e. g., 6, 5, 4, 3, 2 and 6, 5, 5, 3, 2. Antennæ in length about equalling the width of the body.

Collum angularly narrowed down each side, narrowly rounded below; just above each lateral end with two or three striæ.

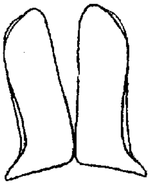


FIG. 1

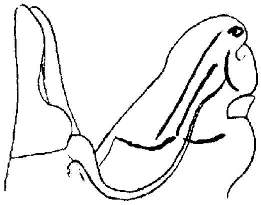


FIG. 2

Fig. 1. Anterior gonopods of *Julus bermudanus* sp. nov., cephalic aspect.
Fig. 2. Mesal aspect of left gonopods of *Julus bermudanus*, sp. nov.

Second and next few segments with striæ back of suture below level of pores, none on dorsum. Farther caudad, however, the striæ are distinct entirely across dorsum. Striæ deeply impressed and extending to or nearly to the caudal edge, the smooth border at most very narrow. Prozonites smooth and shining. Suture distinct, straight, not curved or angulate at level of pore. Pores in contact with sutures on caudal side of which they lie.

Anal tergite rounded behind, equalling or slightly exceeded by the valves. Anal valves mesally slightly margined, a distinct sulcus setting off a narrow but only weakly elevated mesal rim on each.

In the male the cardo of mandibles produced in a laminate form ventrad or caudoventrad, the edge entire. First legs chitinous, strongly uncate. Gonopods concealed. Gonopods having the general arrangement of those of *luscus;* but anterior pair larger, with distal edge less oblique and the posterior pair more conspicuously different and the relations of flagellum also different. (See Figs 1 and 2).

Number of segments (♂), 40–41. The last three or four segments apodous.

Length, near 12 mm.; width, 1.1–1.2 mm.

Locality: Bermuda (J. H. Comstock, 1903, one male, type, author's coll., A. E. Verrill, 1901, one male, paratype, U. S. N. M.)

This species falls in a group with the European *J. luscus* Meinert, *J. londinensis* Leach, *J. britannicus* Verhoeff, etc.

Julus nesophilus sp. nov.

Body in general fuscous, annulate with pale. Collum with a dark band behind a pale anterior border, elsewhere areolate with light. Head with a dark band across and between eyes, the vertex with numerous small light dots in a darker network. Body glabrous.

Head with no setigerous foveolæ on vertex. The usual four foveolæ on clypeus. Antennæ slender and rather shorter than the width of the body. Eyes black, transversely and rather narrowly elliptic. Ocelli about forty-eight in near ten oblique series, e. g., 2, 4, 5, 6, 6, 6, 7, 6, 4, 2.

Collum exceeded by the second segment, at sides rather widely rounded; marked below on each side with three distinct striæ of which the second continues along anterior border as the margining sulcus; above these the caudal border is crossed by a number of shorter striæ, the series extending entirely across plate.

Second segment on each side a little extended forward beneath the collum; strongly striate beneath and part way up the sides, weaker striæ also existing entirely across dorsum. On third and fourth segments the striæ are a little deeper and on subsequent ones strongly marked entirely about the metazonites, the prozonites remaining smooth. The striæ extend to or nearly to the caudal edge, the smooth border, where at all evident, being very narrow. Each repugnatorial pore on the anterior and median segments lies immediately in front of the general level of the segmental suture, but the latter curves forward about it, embracing it closely, excepting on the caudal side. In the more caudal segments the pore is relatively farther caudad and the suture curves more and more gently, becoming more open and not embracing the pore.

Anal tergite not at all caudate or produced, posteriorly obtusely subangulate; a little exceeded by the valves. Mesal borders of anal valves moderately protruding, but not distinctly margined. Anal scale subtriangular, narrowly rounded behind, smooth.

Number of segments (♀), forty-two.

Length, 23 mm.; width, 2.4 mm.

Locality: Harrington Sound. One female (R. W. Glaser). M. C. Z.

I have been unable to identify this with any European or North American species. In the absence of knowledge of the male, however, nothing can be safely asserted as to its more immediate affinities.

RHINOCRICIDÆ.

Rhinocricus monilicornis (Porath).

Spirobolus monilicornis Porath, Bih. Svensk. vet.-Akad. Handl., 1876, 4, no. 7, p. 31.
Spirobolus heilprini Bollman, Proc. Acad. Sci., Phil., 1889, p. 127.
Spirobolus monilicornis Pocock, Ann. Mag. Nat. Hist., 1893, ser. 6, 11, p. 123.

This species appears to be well distributed in South America and the West Indies and is obviously common on the Bermudas.

Localities: Bermuda (Yale Exped., 1898); Hanging Bay (O. Bryant, 27 June, 1903); Harrington Sound (R. W. Glaser); Hungry Bay (A. E. Verrill, April, 1901).

Rhinocricus ectus sp. nov.

Black, each segment with a yellow or ferruginous annulus embracing the caudal half of metazonite or but little more, though often widening down the sides. Collum black, excepting a narrow, pale caudal border on the former. Legs brick red.

Sulcus across vertex distinct, widely interrupted in the frontal region where the head is depressed, the median sulcus evident again across lower part of clypeus. Antennæ short; sensory cones numerous.

Collum rounded below. Margined along anteroventral corner, otherwise smooth and non-striate, or with but a single weak stria just above caudal portion of margining one; exceeded by the second tergite, which extends forward beneath it and bends down a little at anterior edge; flattened beneath where alone it is striate.

Segmental sulcus sharply impressed and distinct throughout. In front of it always a second sulcus which is distinct entirely across dorsum and ordinarily takes its origin a little above level of pore, where it bends rectangularly back toward primary sulcus. Below it is a stria which extends obliquely caudoventrad below pore, a series of other similar fine oblique stries following below it. Pore just in front of the primary sulcus which is gently curved opposite it. Metazonites strongly striate below middle of sides, the series ending some distance below level of pores. Scobina extending back to or near the thirty-fifth somite.

Anal tergite angulate behind, the angle caudally rounded; not caudate, exceeded by the valves. Valves mesally protruding, but not margined or so sharply elevated as in *monilicornis*.

Number of segments, forty-four or forty-five.

Length, 35 mm.-40 mm.; width, 3.5 mm.-4 mm.

Locality: Bermuda (M. C. Z. coll.)

The types of this species are two females. It appears to be close to *R. consociatus* Pocock of Union Id., W. I.; but lack of males of the present form and of specimens of *consociatus* for comparison makes definite conclusions as to precise relationship impracticable. The Bermudan form is more robust, having a width of 4 mm. as against 3 mm., the legs are brick-red instead of lurid, and the pale border of the anal tergite is narrower. More important, the anal tergite of *consociatus* is said, in Pocock's key (Jour. Linn. Soc., 1893, 24, p. 487, etc.) to be produced, though scarcely exceeding the valves. It is not caudate in the present form.

SPIROBOLELLIDÆ.

Microspirobolus excursans sp. nov.

Body in general of a light brown color with dorsum showing a tendency toward a weakly reddish tinge. Typically a darker brown band along each side at level of pores embracing a series of black spots formed by the repugnatorial glands which are always conspicuous. A rather faint middorsal dark line. Each ordinary segment crossed above by a pale band at or in front of the constriction, this bending back at middle where divided by middorsal dark line, sometimes embracing most of prozonite. Legs pale brown or fulvous. Collum without dark markings. Anal segment also light, or sometimes more or less dusky.

Head smooth. A fine sulcus across vertex, ending in a small impressed foveola at upper level of eyes. Clypeal setigerous foveolæ 4+4, the two outermost on each side more widely removed. Eyes subtriangular with apex toward base of antenna and the sides rounded. Ocelli distinct, about thirty-one in number, arranged typically in five rather irregular, subvertical series, e. g., 5, 6, 7, 9, 4. Antennæ very short, gradually enlarged to sixth joint, fitting in a groove in head and mandible on each side.

Collum projecting forward over base of head. Widely rounded below, the anterior corner subrectangularly rounded, the posterior more oblique, the lower edge somewhat flattened or even slightly indented. Margined below and up front as far as level of eyes, otherwise nonstriate and smooth.

The following segments each have the metazonite obviously considerably elevated above level of prozonite, the segment more or less constricted or furrowed about middle, especially laterally. Pore well removed back of furrow, lying half way to the caudal edge from the furrow. Deeply longitudinally striate beneath; laterally with curved striæ on prozonite in and just back of furrow up to level of pore and fewer more straight striæ in corresponding place on metazonite. Dorsally the prozonite is characteristically marked with a network of impressed lines, outlining hexagonal areas, the areas decreasing in size forward from furrow. Metazonite wholly smooth dorsally.

Anal tergite rounded behind, not at all projecting beyond valves. Anal scale transversely narrowly elongate, the caudal edge nearly straight.

Number of segments, thirty-five to forty, mostly thirty-seven or thirty-eight.

Length, near 18 mm.; width, to 2 mm. Male more slender than female.

Locality: Bermuda. Point Shares. Several specimens taken under rotten wood (Bermuda Biol. Sta. for Research, W. L. Crozier coll., 5 Oct., 1917). In M. C. Z. coll.

No adult male is represented, so the reference to Microspirobolus is in some degree tentative. It seems to conform so far as may be judged from females, which much resemble those of West Indian species.

STRONGYLOSOMIDÆ.

Strongylosoma guerinii (Gervais).

Polydesmus Guerinii, Ann. Soc. Ent. France, 1836, p. 686.
Strongylosoma Guerinii Gervais, Ons. Apt., 1847, 4, p. 116.
Strongylosoma Guerinii Pocock, Ann. and Mag. Nat. Hist., 1893, ser. 6, 11, p. 116.

In the collection of the U. S. Nat. Mus. is a female of this species taken on Bermuda by G. B. Goode. It was also in material collected on the islands by the Challenger Exped. (Pocock, Op. cit.) This species is common on the eastern side of the Atlantic in the Azores, Madeira, Spain, Portugal, Teneriffe, Algeria, Tunis, and Kameroon.

Orthomorpha coarctata (Saussure).

Polydesmus coarctatus Saussure, Mem. Soc. phys. Geneve, 1860, p. 39, fig. 18.
Strongylosoma coarctatum Pocock, Ann. and Mag. Nat. Hist., 1893, ser. 6, p. 123.

This species now has a tropicopolitan distribution and is one of the millipedes most frequently met with on tropical islands everywhere. Pocock records it from Bermuda (Op. cit.), and I have examined two specimens from the Bermuda Biological Station for Research, collected by W. L. Crozier at Point Shares, 5 Oct., 1917, where they were found under rotten wood.

CHILOPODA.

SCOLOPENDRIDÆ.

Scolopendra subspinipes Leach.

Trans. Linn. Soc., London, 1814, 11, p. 383.
Scolopendra subspinipes Pocock, Ann. and Mag. Nat. Hist., 1893, ser. 6, 11, p. 123.

This large centipede is found commonly throughout the warmer parts of the earth, excepting the Mediterreanean region. Its centre of distribution, however, would seem undoubtedly to be the East Indian region, where it is most abundant and presents its greatest variations.

Localities: Bermuda Id. (south side of Id., O. Bryant, 21 Aug., 1903; E. L. Mark, April, 1890; U. S. N. M. Coll.; no other data). Tucker's Id. (E. L. Mark, 1 Aug., 1907).

MECISTOCEPHALIDÆ.

Mecistocephalus maxillaris (Gervais).

Geophilus maxillaris Gervais, Ann. Sci. Nat., ser. 2, 1837, 7, p. 52.
Mecistocephalus guildingii Newport, Trans. Linn. Soc. London, 1845, 19, p. 429.
Mecostocephalus guildingii Bollman, Proc. Acad. Sci. Phil. 1889, p. 129.

A tropicopolitan species, though commonly occurring rather sparsely. It is well known, e. g., from South America, West Indies, Hawaii, Samoa, Philippines, New Guinea, India and Africa. It also sometimes occurs in hothouses in temperate regions, as in Europe and North America (Washington, D. C.)

Localities: Bermuda Id. (South side, O. Bryant, 21 Aug., 1903); Harrington Sd. (R. W. Glaser); Dyer Id. (15 June, 1918, W. L. Crozier); Waterloo (A. E. Verrill, April., 1901).

SCHENDYLIDÆ.

Hydroschendyla submarina (Grube).

(Pl. XXII, Figs. 1 to 5)

Geophilus (*Schendyla*) *submarinus* Grube, Abh. Schles. Ges. vaterl. Cultur, Breslau, 1869, p. 82.
Hydroschendyla submarina Brölemann and Ribaut, Nouv. Archiv du Mus. d'Hist. Nat., ser. 5, 4, p. 137, pl. 7, figs. 110-118.

It is a matter of considerable interest to be able to add to the known chilopod fauna of the Bermudas this European marine geophiloid. The form was previously known to occur on the Mediterreanean and Atlantic coasts of France, the coasts of England (Jersey, Plymouth) and Ireland (Galway), and northward to Denmark and Sweden. It has also been recorded from Italy (Portici, Berlese, 1882); but there is some doubt as to the correctness of the identification in this case. Grube (Op. cit., p. 82-83) found it at St. Malo and Roscoff often in large numbers under stones and in fissures covered at high tide. A male of this species was taken by O. Bryant on the Bermudas at Hungry Bay (10 July, 1903), where it was "found under a stone nearly at low tide mark." I have examined also a female taken at Port Royal (25 June, 1918) in a similar location by Dr. W. L. Crozier, who has supplied me with the following field notes on the form." The intertidal form lives (a) around the edges of eroded, flat stones; (b) in isolated and much honeycombed blocks of limestone; in either case about nine inches below mean high water. The rock, porous aeolian limestone, or beach rock, is much eroded. The situation is usually muddy (i. e., deposits of silt, calcareous, on the rock). The centipede comes very near to the surface of the rock, sticks its head out into the open, and is even seen running over the moist surface of shaded stones. The animals are not plentiful, but I have seen them at Flatts Inlet, at Port Royal, Great Sound, and at Dyer Id. The rocks inhabited by them are frequently found in little coves, moderately shaded by overhanging ledges. *Onchidium floridanum* lives in the same situations and sometimes uses the same cavities. The centipede eats leodicids, in five instances I have noted, by biting into the side of the creature, licking up the juices and creeping off out of sight with one of the fragments into which the worm autotomises. The centipede, except for color, looks not very unlike the leodicids, which occur plentifully in similar situations, though the distribution of the two types is not coincident. As I remember, Dr. Treadwell found none of the centipedes in all his rock-splitting operations after worms, although he was more or less on the lookout for them. It creeps much like an annelid, the body thrown into waves."

It may be mentioned that the closely allied *Pectiniunguis americanus* also seems to have a strictly littoral habitat, occurring under sea-weed, drift-wood, etc., on the coasts of the Gulf of Mexico, including Florida, and on the coasts of Lower California. Another geophiloid of a different family, *Linotaenia maritima* (Leach), seems similarly to have a littoral habitat. Its distribution in Europe is nearly the same as that of *Hydroschendyla submarina* Its habits are indicated in the following note by R. I. Pocock.* "Great, therefore, was my astonishment, when, turning over the line of seaweed marking the high spring-tide, to find specimens of all sizes swarming amongst the slimy decaying fronds and wriggling away into darkness in company with hosts of scuttling woodlice and hopping sand-shrimps; while here and there was a cluster of them feeding upon the remains of one of the crustaceans." It is significant to note that the geophiloids in general seem to have a strikingly greater power of resistance to prolonged submersion in fresh as well as in sea-water than other chilopods, such as scolopendrids, as has been experimentally demonstrated by Plateau.*

---

* Marine Centipede in Somerset, Zoologist, 1900, ser. 4, 4, p. 484.

After examining only the male of this form from the Bermudas, I was inclined to consider it as distinct from the European species; but further study of a female in comparison with one from Banyuls-sur-Mer, France, kindly sent to me by Dr. Brölemann, shows the Bermudan and European forms to be undoubtedly identical. The male and female from the Bermudas have respectively forty-seven and forty-nine pairs of legs, the numbers most frequent in European specimens, and measure 32 and 20 mm. in length. They are yellow, excepting the end regions which are ferruginous. Structurally they agree in general with the exhaustive description given by Brölemann and Ribaut (Opp. cit.). In this description no mention is made of definite chitinous pockets in a few of the anterior plates; but the specimens agree in showing these. The Bermudan male, cleared and mounted, shows pronounced and strongly chitinized infoldings, or pockets, in the anterior edges of the ninth to thirteenth sternites, with a much shallower one on the eighth and fourteenth. The prebasal plate in the male is covered; but this is probably due to shrinkage in the alcohol, as it is exposed in the normal manner in the female.

LITHOBIIDÆ.

Lithobius provocator Pocock.

Ann. and Mag. Nat. Hist., 1891, ser. 6, 8, p. 152.

Lithobius provocator Pocock, ibid., 1893, 11, p. 122.
Lithobius bermudensis Pocock, ibid., 1893, 11, p. 126.
Lithobius provocator Chamberlin, Proc. Acad. Sci. Phil., 1904, p. 653.

Color varying from light to deep brown, often showing a median longitudinal pale stripe, and the head with first and last one or two plates commonly more reddish, chestnut to mahogany. Prosternum and prehensors brown, the latter rufous distally. Antennæ brown to mahogany, mostly nearly uniform. Posterior legs concolorous with dorsum, uniform or with last one or two articles paler.

Head subcordate, widest at or a little in front of marginal breaks. A little wider than long (25 x 24). Hairs short and few. Punctæ weak and scattered. Antennæ with articles thirty-seven to fifty-eight in number, forty-six being frequent; reaching seventh or eighth segment.

---

* Les Myriopodes marins et la Resistance des Arthropodes a respiration aerieen a la submersion, Jour. de l'Anat. et Physiol, 1890, 26, p. 236-269.

Ocelli fourteen to twenty-five, in four or five series: e. g., 1+4, 4, 3, 2; 1+5, 5, 4, 3; 1+5, 5, 4, 4, 3; 1+6, 5, 5, 5, 3. Single ocellus suboval, much largest, well separated from the others. Ocelli of most dorsal row largest, the others decreasing gradually and usually uniformly ventrad. Organ of Tomosvary on ventral surface ventrocephalad of eye-patch, in size about equalling one of the smaller ocelli.

Prosternum 1.73± times wider than long. Distance between chitinous spots not quite twice the width at level of mesal incision or interval; 2.23± times the dental line. Teeth 4+4 to 8+8, mostly 5+5 or 6+6 and frequently 5+6, a small extra tooth appearing in the diastema which normally separates the outermost tooth on each side from the others, or sometimes two, 6+8, the odd tooth or teeth most often noted on the right side. Teeth distally rounded, each commonly appearing to be separately a little elevated. Alternate teeth often reduced. Ectal spine long and acute, truly spiniform, situated just back of the diastema on each side. When the larger numbers of teeth are present, one or more commonly appear in the diastema, thus apparently obliterating it, but the spine always retains the normal position.

Posterior dorsal plates under a lens commonly appearing tuberculate or rugose, the anterior ones smoother. Posterior angles of ninth, eleventh and thirteenth plates strongly produced. Widths of head and of first, third, eighth, tenth and twelfth plates to each other nearly as 35 : 35 : 34 : 35 : 35 : 35, the sides being nearly parallel over much of length. A specimen 24 mm. long has the tenth plate 3.5 mm. wide, the body thus only 6.8 times longer than wide in this case.

Coxal pores transversely elongate, from elliptic to oblong or key-hole shaped: 5, 7, 7, 5 to 7, 9, 9, 7, other arrangements noted being 6, 8, 8, 6 and 7, 8, 8, 7. Sometimes two small pores appear side by side in the most proximal position.

Spines of first legs, $\frac{0,\ 0,\ 3,\ 2,\ 1}{0,\ 0,\ 2,\ 3,\ 2}$; of second to tenth, inclusive, $\frac{0,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 2,\ 3,\ 2}$; of the elevanth and twelfth, $\frac{0,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 3,\ 3,\ 2}$; of the thirteenth $\frac{1,\ 0,\ 3,\ 2,\ 2}{0,\ 1,\ 3,\ 3,\ 2}$; of the fourteenth, $\frac{1,\ 0,\ 3,\ 1,\ 1}{0,\ 1,\ 3,\ 3,\ 2}$, claws 2, or a third one scarcely evident; of anal, $\frac{1,\ 0,\ 3,\ 1,\ 0}{0,\ 1,\ 3,\ 3,\ 1}$, claws 2. Last three pairs of coxæ laterally armed.

Claws of female gonopods rather short, tripartite, the lobes short. Basal spines 2+2, rather long, of about equal width from base to beginning of the short, acuminate tip which occupies only about one-fourth of total length, the sides parallel or a little incurved.

Length, 18 to 27 mm.

Praematurus—Antennæ consisting of forty-one articles. Each eye consisting of ten ocelli, thus, 1+4, 3, 2.

Prosternum with teeth 4+4 of which the outermost and innermost on each side are smaller than the others. The most mesal tooth on each side is, as usual, closer to the next tooth than the others are to each other, the intervals between the first and second and the second and third from the outside being large. Spine in normal position opposite interval between first and second teeth.

Coxal pores 5, 5, 5, 5, circular and subcircular.

Spines of first legs $\frac{0,\ 0,\ 2,\ 2,\ 1}{0,\ 0,\ 1,\ 2,\ 1}$; of the second $\frac{0,\ 0,\ 3,\ 2,\ 1}{0,\ 0,\ 2,\ 3,\ 2}$; of the third to seventh, $\frac{0,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 2,\ 3,\ 2}$; of the eleventh, $\frac{0,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 2,\ 3,\ 2}$; of the twelfth $\frac{1,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 3,\ 3,\ 2}$; of the thirteenth, $\frac{1,\ 0,\ 3,\ 1,\ 2}{0,\ 1,\ 3,\ 3,\ 2}$; of the fourteenth, $\frac{1,0,3,1,1}{0,1,3,3,3}$; and of the anal, $\frac{1,\ 0,\ 3,\ 1,\ 0}{0,\ 1,\ 3,\ 3,\ 1}$. Last three coxæ laterally armed.

Claw of gonopods of female tripartite, the lobes acute, the median one much longest. Spines 2+2, acute, tapering from base, the inner one of each pair about two-thirds the length of the outer one.

Length, 12 to 14 mm.

Agenitalis II—Antennæ consisting of thirty articles of which the ultimate is long, equalling the three preceding ones taken together. Each eye composed of five ocelli arranged in two series: thus, 1+2, 2, the single ocellus oboval, but slightly largest, all well separated.

Prosternum with teeth 2+2, subacute, those of each pair well separated. Median interval semicircular. Spine near ectal corner on each side, straight.

Coxal pores circular 1 (2), 2, 2, 2.

Spines of first legs, $\frac{0,\ 0,\ 0,\ 1,\ 1}{0,\ 0,\ 0,\ 1,\ 1}$; of the second and third, $\frac{0,\ 0,\ 1,\ 1,\ 1}{0,\ 0,\ 0,\ 1,\ 1}$; of the fourth, $\frac{0,\ 0,\ 1,\ 1,\ 1}{0,\ 0(1),\ 1,\ 1}$; of the fifth, $\frac{0,\ 0,\ 1,\ 1,\ 1}{0,\ 0,\ 1,\ 1,\ 1}$; of the sixth, $\frac{0,\ 0,\ 1,\ 1,\ 1}{0,\ 0,\ 1,\ 2,\ 1}$; of the seventh, $\frac{0,\ 0,\ 2,\ 2,\ 1}{0,\ 0,\ 1,\ 2,\ 1}$; of the eighth and ninth, $\frac{0,\ 0,\ 2,\ 2,\ 2}{0,\ 0,\ 1,\ 2,\ 1}$; of the tenth, and eleventh, $\frac{0,\ 0,\ 3,\ 2,\ 2}{0,\ 0,\ 1,\ 2,\ 1}$ of the twelfth, $\frac{0,\ 0,\ 3,\ 1,\ 1}{0,0,2,2,2(1)}$; of the thirteenth, $\frac{1,\ 0,\ 3(1),\ 1,\ 1}{0,\ 0,\ 2,\ 2,\ 1(2)}$; of the fourteenth, $\frac{1,\ 0,\ 3,\ 1,\ 1}{0,\ 1,\ 3,\ 3,\ 1}$, claws two; of the anal, $\frac{1,\ 0,\ 3,\ 0(1),\ 0}{0,\ 1,\ 3,\ 2,\ 0}$, claws two. The lateral spine of the anal coxæ is represented by a minute transparent point not at all developed on the others.

Length, cir. 7.6 mm.

Localities: Bermuda Id. (Yale Exped., 1898, A. E. Verrill, 1901, O. Bryant, J. H. Comstock); Flatts Inlet; Hamilton (T. Barbour, 1903); Tucker Id. (A. E. Verrill, 1901); Paynter's Vale (Bermuda Biol. Sta. for Research, E. L. Mark, 1903); Hungry Bay (O. Bryant); Harrington Sd. (Bermuda Biol. Sta. for Research, R. W. Glaser).

Evidently a very common species on the islands. Pocock's *Lithobius bermudensis* agrees so nearly with the praematurus stage of *provocator* that I regard them as the same. While in specimens of the length designated by Pocock the prosternal teeth are ordinarily 3+3 or 4+4, I have two individuals of the praematurus stage 12 mm. long in which the prosternal teeth are 2+2 and 2+3 respectively.

While in general appearance this species much resembles the common European and North American *Lithobius forficatus* Linné, Pocock's suggestion (1893, Loc. cit.) that it may not be a truly distinct form is not well founded. Aside from the presence of two claws on each anal leg and the lateral arming of the last three pairs of coxæ, an even more important difference is evident in the prosternum, where the position of the special spine mesad of the ectal tooth on each side distinguishes the Bermuda form not only from *forficatus*, but apparently also from other species of the genus in its more restricted sense. Correlated with this position of the spine is the normal presence of a diastema separating the outer tooth from the others, though this may often show one or more interpolated minor teeth.

SCUTIGERIDÆ.

Scutigera coleoptrata (Linne).

Scolopendra coleoptrata Syst. Nat., ed. 10, 1, 1758, p. 637.
Scutigera coleoptrata Pocock, Ann. and Mag. Nat. Hist., 1893, ser. 6, 11, p. 122, 124.
Scutigera forceps Verrill, Trans. Conn. Acad. Sci., 1902, 11, p. 843.

This house-centipede seems not to be uncommon on the main island where it occurs in houses and cellars, etc. Verrill also took a specimen at the old forts on Castle Id. Five specimens which I have had for examination, seem not to differ from *Scutigera coleoptrata* (Linné), a species occurring commonly also in the Azores, Madeiras and the western and more southern parts of Europe. On the other hand, the species seems to be also identical with the common North American form. At any rate it seems impossible to separate alcoholic material from the three regions mentioned on the basis of any characters thus far pointed out. I cannot speak with confidence as to coloration as it may be present in the living animals. Certainly there can be no separation on the basis of the characters to which Verhoeff gives primary importance in his study of the genus in Europe,* such as the number and arrangement of the spinules on the fifth, sixth and seventh tergites, the number of articles in the first division of the antennæ *(flagellum primum)*, the number of divisions in first and second tarsi and the number and arrangement of the "pegs" on the latter, and the number and arrangement of spinules on the several joints of the legs. In fact, the variation in these characters in such, often on the two sides of the same animal, that one cannot help feeling skeptical as to the validity of the species and subspecies established by Verhoeff in the place mentioned, since the characters are used in the key with rather narrow limits, and the material studied by him was not extensive.

The tabulations which follow are constructed to represent the variations found in the characters mentioned in several individuals from the Bermudas and from the United States in comparison with a standard one from Toulouse, France, sent me through the kindness of Dr. Brölemann. In the first table the plus sign in the first two columns in the case of each tergite is used to separate the number on the left side from that on the right. In the third column is given only the general total of spinules for the surface, exclusive of margins and saddle. In the second table, showing the number of articles in the first division of the antennæ and in the first and second tarsi, the plus sign is used to separate the number of articles in the first tarsus (always given first) from the number in the second. In the subsequent tabulations, giving the spinules of the legs, the plus sign where appearing under femur and tibia is used to separate the number of spines at the distal margin given after the sign, from the number appearing proximad of this in the position indicated. Under tarsus I the sign separates the number of spinules appearing on successive articles beginning with the first. Under tarsus II the numbers given represent the number of segments, counting from the most proximal, upon which pegs appear. Where in this column a dash appears, it indicates that pegs appear continuously on joints between those thus separated, inclusive; e. g., 11–13 means that a peg appears on each of the eleventh, twelfth and thirteenth articles. In ascertaining the spinules of the legs the method was in general to clear and mount the legs in order, with anterior faces down. It was thought sufficient for the present purposes to count the spinules of dorsal and ventral lines, in the case of femur and tibia, and of those that appear on the intermediate caudal surface in the three lines of hair approximately caudodorsal, caudomesal and caudoventral in position, since the spinules of the anterior surface vary in similar degree. Thus the abbreviations at the heads of the minor columns stand respectively for dorsal, ventral, caudodorsal, caudomesal and caudoventral.

---

* Über Scutigeriden, 5, Aufsatz, Zool. Anz., 1905, 19, p. 76.

The lengths of the several individuals furnishing the data given in the several tables are as follows:

Bermuda a, 23 mm.
Bermuda b, 19 mm.
Bermuda c, 21 mm.
Bermuda d, 22 mm.
Bermuda e, 16 mm.
France, 25 mm.
Salem, Mass., 26 mm.

Boston a, 23 mm.
Boston b, 20 mm.
Boston c, 19 mm.
Boston d, 22 mm.
Beaufort, N. C., 20 mm.
Texas, 25 mm.
Washington, D. C., 17 mm.

TABLE I.

SPINULES OF DORSAL PLATES.

	PLATE V			PLATE VI			PLATE VII		
	Margin	Saddle	Other	Margin	Saddle	Other	Margin	Saddle	Other
Bermuda a	11+13	1+1	38	10+11	5+3	15	6+9	6+6	54
Bermuda b	9+15	4+2	34	16+16	5+5	45	2+3	5+6	30
Bermuda c	rubbed	rubbed	—	10+9	4+3	27	3+2	3+2	19
Bermuda e	7+6	3+2	36	6+4	4+4	41	0+0	4+3	15
France	16+15	4+2	32	14+16	6+6	41	4+5	6+5	34
Salem	17+13	6+9	46	17+12	9+8	65	7+6	6+5	51
Boston	19+19	6+4	53	18+17	4+4	57	3+2	2+5	34
Boston b	17+18	5+4	50	18+18	6+9	67	6+9	5+7	43
Boston c	18+18	1+4	35	11+13	3+5	31	2+3	2+3	25
Washington	19+13	5+6	32	15+16	4+4	22	4+6	2+5	21

TABLE 2A.

ARTICLES OF ANTENNA I AND OF TARSI OF LEGS I TO IV.

	I ANTENNA		LEG I		LEG II		LEG III		LEG IV	
	Rt.	Lft.	Rt.	Lft.	Rt.	Lft.	Rt.	Lft.	Rt.	Lft.
Bermuda a	90	93	14+34	16+36	12+32	13+31	11+32	11+32	9+32	9+30
Bermuda b	107	97	—	—	—	—	—	—	—	—
Bermuda c	67	73	—	13+34	13+30	11+29	10+28	—	13+20	—
Bermuda d	93	88	—	—	—	—	—	—	—	—
Bermuda e	67	66	13+28	13+28	11+27	—	9+26	10+26	7+26	—
France	74	66	16+34	15+35	14+33	13+35	12+32	13+32	10+28	12+32
Salem	73	69	15+33	—	12+33	—	12+32	—	10+28	—
Boston a	99	—	—	—	—	—	—	—	—	—
Boston b	76	91	14+36	14+35	13+33	13+34	12+32	13+33	—	11+29
Boston c	74	81	—	—	—	—	—	—	—	—
Boston d	—	—	—	15+32	—	13+30	—	12+29	10+30	10+28
Beaufort	—	91	14+34	15+33	—	13+?	11+30	12+29	9+?	11+25
Texas	80	—	14+34	15+35	13+32	13+32	12+31	12+32	10+30	11+31
Washington	*	*	—	—	—	13+31	—	—	—	11+29

TABLE 2B.

ARTICLES OF TARSI OF LEGS V TO IX.

	LEG V		LEG VI		LEG VII		LEG VIII		LEG IX	
	Rt.	Lft.	Rt.	Lft.	Rt.	Lft.	Rt	Lft.	Rt.	Lft.
Bermuda a	9+27	8+28	14+18	9+26	8+25	8+30	8+28	8+28	7+28	8+29
Bermuda c	10+28	—	—	7+26	8+26	7+27	7+29	—		7+26
Bermuda e	—	8+26	—	7+25	—	—	7+24	—	—	—
France	8+29	10+32	8+31	8+28	—	8+26	8+27	7+31	8+27	8+27
Salem	8+28	—	8+27	—	7+25	—	—	—	—	—
Boston b	8+30	8+32	9+29	8+29	8+?	8+31	8+29	7+29	8+30	8+31
Boston d	9+26	10+29	8+28	9+27	8+28	8+28	8+27	—	—	—
Beaufort	10+26	8+27	8+26	9+?	7+26	—	8+27	—	—	—
Texas	10+28	8+30	—	—	8+28	8+28	8+28	8+28	—	10+26
Washington	9+31	8+32	—	8+29	—	—	7+30	—	—	—

TABLE 2C.

ARTICLES OF TARSI OF LEGS X TO XIV.

	LEG X		LEG XI		LEG XII		LEG XIII		LEG XIV	
	Rt.	Lft.	Rt.	Lft.	Rt.	Lft.	Rt.	Lft.	Rt.	Lft.
Bermuda a	8+28	8+29	7+29	9+?	8+28	8+29	9+?	7+24	9+32	9+33
Bermuda c	7+29	7+27	—	6+30	8+29	—	—	—	—	—
Bermuda c	6+26	—	7+27	11+27	—	7+?	—	—	—	—
France	8+28	8+27	9+30	9+31	—	—	—	9+33	9+38	9+36
Salem	8+29	—	—	7+29	8+29	—	8+32	—	—	—
Boston b	8+30	8+31	8+31	8+30	9+31	9+26	8+35	8+33	13+36	10+39
Boston d	—	—	—	—	—	—	—	—	—	—
Beaufort	—	—	7+29	—	—	—	—	—	—	—
Texas	8+30	8+30	8+28	—	—	—	9+34	10+34	—	10+?
Washington	—	8+31	—	8+30	—	—	—	8+32	—	—

TABLE 3A.

SPINULES OF FEMUR AND TIBIA OF LEG I.

		FEMUR					TIBIA				
		d.	v.	cd.	cm.	cv.	d.	v.	cd.	cm.	cv.
Bermuda a	Rt.	0	0	0	0	0	0	0	0	0	2+1
	Lft.	0	0	0	0	0	0	0	0	0	2+1
Bermuda c	Rt.	0	0	0	0	0	0	0	0	0	0
	Lft.	0	0	0	0	0	0	0	0	0	0
Bermuda e	Rt.	0	0	0	0	0	0	0	0	0	0
	Lft.	0	0	0	0	0	0	0	0	0	0
France	Rt.	0	0	0	0	0	0	0	0	0	0
	Lft.	0	0	0	0	0	0	0	0	0	0
Salem	Rt.	0	0	0	0	0	0	0	0	0	0
	Lft.	0	0	0	0	0	0	0	0	0	0
Boston b	Rt.	0	0	0	0	0	0	0	0	0	0
	Lft.	0	0	0	0	0	0	0	0	0	0
Boston d	Rt.	0	0	0	0	0	0	0	0	0	0
	Lft.	0	0	0	0	0	0	0	0	0	0
Beaufort	Rt.	0	0	0	0	0	0	0	0	0	0
	Lft.	0	0	0	0	0	0	0	0	0+1	0
Texas	Rt.	0	0	0	0	0	0	0	0	0	0+1
	Lft.	0	0	0	0	0	0	0	0	0	0
Washington	Rt.	0	0	0	0	0	0	0	0	0	0
	Lft.	0	0	0	0	0	0	0	0	0	0

TABLE 3B.

SPINULES OF METATARSUS AND OF TARSUS I, AND PEGS OF TARSUS II OF LEG I.

		METATARSUS			TARSUS I	TARSUS II
		d	v	cd		
Bermuda a	Rt.	0	0	0	0	7, 9, 15, 17, 19, 23, 25, 27, 29
	Lft.	0	0	0	0	9, 11, 13, 19, 21, 23, 25, 27, 29
Bermuda c	Rt.	—	—	—	—	—
	Lft.	0	0	0	0	14, 16, 18, 20, 22, 24, 26, 28
Bermuda e	Rt.	0	0	0	0	9, 11, 13, 15, 17, 19, 21, 23
	Lft.	0	0	0	0	11, 19, 21, 23
France	Rt.	0	0	0	0	10, 12, 14, 16, 18, 20, 22
	Lft.	0	0	0	0	15, 17, 19, 21, 23, 25, 27, 29
Salem	Rt.	0	0	0	0	9, 11, 13, 17, 19, 21, 25, 27
	Lft.	—	—	—	—	—
Boston b	Rt.	0	0	0	0	10, 12, 14, 16, 18, 20, 22, 24, 26, 28
	Lft.	0	0	0	0	11, 13, 15, 17, 19, 21, 23, 25, 27
Boston d	Rt.	—	—	—	—	—
	Lft.	0	0	0	0	10, 12, 14, 16, 18, 20, 22, 24, 26
Beaufort	Rt.	0	0	0	0	10, 12—14, 16—18, 20, 22, 24, 26
	Lft.	0	0	0	0	11, 13, 15, 17, 19, 21, 23, 25, 27
Texas	Rt.	0	0	0	0	12, 14, 16, 18, 20, 22, 24, (26), 28
	Lft.	0	0	0	0	11—13, 15, 17, 19, 21, 23, 25, 27, 29
Washington	Rt.	—	—	—	—	—
	Lft.	—	—	—	—	—

TABLE 4A.

SPINULES OF FEMUR AND TIBIA OF LEG II.

		FEMUR					TIBIA				
		d.	v.	cd.	cm.	cv.	d.	v.	cd.	cm.	cv.
Bermuda a	Rt.	0	0	0	0	0	0	0	0	0	5+1
	Lft.	0	0	0	0	0	0	0	0	0	4+1
Bermuda c	Rt.	0	0	0	0	0	0	0	0	0	0
	Lft.	0	0	0	0	0	0	0	4	0	0
Bermuda e	Rt.	0	0	0	0	0	0	0	0	0	0
	Lft.	—	—	—	—	—	—	—	—	—	—
France.....	Rt.	0	0	0	0	0	0	0	0	0	2+1
	Lft.	0	0	0	0	2	0	0	0	0	2+1
Salem.....	Rt.	0	0	0	0	0	0	0	0	0	0+1
	Lft.	—	—	—	—	—	—	—	—	—	—
Boston b..	Rt.	0	0	0	0	1	0	0	0	0	3+0
	Lft.	0	0	0	0	2	0	0	0	0	2+1
Boston d..	Rt.	—	—	—		—	—	—	—	—	—
	Lft.	0	0	0	0	0	0	0	0	0	0
Beaufort...	Rt.	—	—	—	—	—	—	—		—	—
	Lft.	0	0	0	0	0	0	0	0	0	2+1
Texas......	Rt.	0	0	0	0	0	0	0	0	0	0+1
	Lft.	0	0	0	0	0	0	0	0	0	0+1
Washington	Rt.	—	—	—	—	—	—	—		—	—
	Lft.	0	0	0	0	0	0	0	0	0	0

TABLE 4B.

SPINULES OF METATARSUS AND TARSUS I, AND PEGS OF TARSUS II OF LEG II.

		METATARSUS			TARSUS I	TARSUS II
		d.	v.	cd.		
Bermuda a........	Rt.......	0	0	0	0	10, 11, 13, 15, 17, 19, 21—24, 26
	Lft......	0	0	0	0	10, 12, 14, 16, 18, 20, 22, 23, 26
Bermuda c........	Rt.......	0	0	0	0	7, 9, 11, 14, 16, 18, 20, 23, 24, 26
	Lft......	0	0	0	0	15, 17—19, 21, 23
Bermuda e........	Rt.......	0	0	0	0	10, 12, 14—16, 18, 20, 22
	Lft......	—	—	—	—	—
France............	Rt.......	0	0	0	0	8, 10, 12, 14, 16, 18, 20, 22, 24, 26
	Lft......	0	0	0	0	9, 11, 13, 15, 17, 19, 21, 23, 25
Salem............	Rt.......	0	0	0	0	1, 11, 13, 14, 19, 21, 23, 25, 27
	Lft......	—	—	—	—	—
Boston b..........	Rt.......	0	0	0	0	6, 8, 10, 12, 14, 16, 18, 22, 24, 26
	Lft......	0	0	0	0	(10), 12—18, 20—22, 24
Boston d..........	Rt.......	—	—	—	—	—
	Lft......	0	0	0	0	10, 12, 14, 16—18, 20, 22, 24
Beaufort..........	Rt.......	—	—	—	—	—
	Lft......	0	0	0	0	—
Texas............	Rt.......	0	0	0	0	10, 12, 14, 16, 18, 20, 22, 24, 26
	Lft......	0	0	0	0	8, 10, 12, 14, 16, 18, 20, 22, 24, 26
Washington.......	Rt.......	—	—	—	—	—
	Lft......	0	0	0	0	11, 13, 15, 17, 19, 21, 23

TABLE 5A.

SPINULES OF FEMUR AND TIBIA OF LEG III.

		FEMUR					TIBIA				
		d.	v.	cd.	cm.	cv.	d.	v.	cd.	cm.	cv.
Bermuda a	Rt.	0	0	0	0	0	0	0	0	2	5+1
	Lft.	0	0	0	0	0	0	0	0	3	5+1
Bermuda c	Rt.	0	0	0	0	0	0	0	0	0	0
	Lft.	—	—	—	—	—	—	—	—	—	—
Bermuda e	Rt.	0	0	0	0	0	0	0	0	0	0
	Lft.	0	0	0	0	0	0	0	0	0	0
France....	Rt.	0	0	0	0	3				1	4+1
	Lft.	0	0	0	0	7			2	2	4+1
Salem.....	Rt.	0	0	0	0	0	0	0	0	2	2
	Lft.	—	—	—	—	—	—	—	—	—	—
Boston b..	Rt.	0	0	0	0	7	0	0	0	4	5+1
	Lft.	0	0	0	0	6	0	0	0	3	3+1
Boston d..	Rt.	—	—	—	—	—	—	—	—	—	—
	Lft.	0	0	0	0	5	0	0	1	0	3+1
Beaufort...	Rt.	0	0	0	0	4	0	0	1	3	5+1
	Lft.	0	0	0	0	3	0	0	0	5	2+1
Texas......	Rt.	0	0	0	0	0	2	0	1	1	2+1
	Lft.	0	0	0	0	2+1	0	0	3	0	4+1
Washington	Rt.	—	—	—	—	—	—	—	—	—	—
	Lft.	—	—	—	—	—	—	—	—	—	—

TABLE 5B.

SPINULES OF METATARSUS AND TARSUS I AND PEGS OF TARSUS II OF LEG III.

		METATARSUS			TARSUS I	TARSUS II
		d.	v.	cd.		
Bermuda a........	Rt.......	0	0	0	1	9, 11—13, 15—17, 19, 21
	Lft......	0	0	0	1	10, 12, 14, 16, 18, 20, 22
Bermuda c........	Rt.......	0	0	0	0	?
	Lft......	—	—	—	—	—
Bermuda e........	Rt.......	0	0	0	0	9, 11, 13, 15, 17, 19, 21
	Lft......	0	0	0	0	9, 11, 13, 15, 17, 19, 21
France............	Rt.......	0	0	0	0	11, 13, 15, 19, 23, 25
	Lft......	0	0	0	0+1	10, 12, 14, 16, 18, 20, 23, 24
Salem............	Rt.......	0	0	0	1	12, 14, 16, 17, 19, 21, 23, 25, 27
	Lft......	—	—	—	—	—
Boston b..........	Rt.......	0	0	0	0	7, 9, 11, 13, 15, 17, 19, 21, 23, 25
	Lft......	0	0	0	0	10, 12, 14, 16, 18, 20, 22, 24, 26
Boston d..........	Rt.......	—	—	—	—	—
	Lft......	0	0	0	0	11, 13, 15, 17, 19—21
Beaufort..........	Rt.......	0	0	0	0	?
	Lft......	0	0	0	0	?
Texas............	Rt.......	0	0	0	0	10, 12, 14, 16, 18, 20, 22, 24, 26
	Lft......	0	0	0	0	12, 14, 18, 20, 22, 24, 26
Washington.......	Rt.......	—	—	—	—	—
	Lft......	—	—	—	—	—

Table 6a.

SPINULES OF FEMUR AND TIBIA OF LEG IV.

		FEMUR					TIBIA				
		d.	v.	cd.	cm.	cv.	d.	v.	cd.	cm.	cv.
Bermuda a	Rt.	0	0	0	0	4+1	0	0	7	1	7
	Lft.	0	0	0	0	3	0	0	4	2	4+1
Bermuda c	Rt.	0	0	0	0	0	0	4	0	0	0
	Lft.	—	—	—	—	—	—	—	—	—	—
Bermuda e	Rt.	0	0	0	0	4	0	0	4	0	0+1
	Lft.	—	—	—	—	—	—	—	—	—	—
France	Rt.	—	—	—	—	—	—	—	—	—	—
	Lft.	0	0	0	0	6+1	0	0	3	5	4+1
Salem	Rt.	0	0	0	0	5+1	0	0	5	5	3
	Lft.	—	—	—	—	—	—	—	—	—	—
Boston b	Rt.	—	—	—	—	—	—	—	—	—	—
	Lft.	0	0	0	0	7+1	0	0	2	5	5+1
Boston d	Rt.	0	0	0	0	4	0	0	4	4	3+1
	Lft.	0	0	0	0	5	0	0	2	4	5+1
Beaufort	Rt.	0	4	0	0	0+1	0	0	5	6	4+1
	Lft.	0	0	0	4	0	0	0	6	4	4+1
Texas	Rt.	0	0	0	0	4+1	0	0	5	4	3+1
	Lft.	0	0	0	0	5+1	0	0	3	0	4+1
Washington	Rt.	—	—	—	—	—	—	—	—	—	—
	Lft.	0	1	0	0	3	0	0	0	1	3

Table 6b.

SPINULES OF METATARSUS AND TARSUS I AND PEGS OF TARSUS II OF LEG IV.

		METATARSUS			TARSUS I	TARSUS II
		d.	v.	cd.		
Bermuda a	Rt	0	0	3	0	10, 15, 20
	Lft	0	0	0	0	12, 14—16, 18—20, 22, 24
Bermuda c	Rt	0	0	0	0	9, 11, 13, 15, 17
	Lft	—	—	—	—	—
Bermuda e	Rt	0	0	0	0	11, 13, 15, 17, 19, 21
	Lft	—	—	—	—	—
France	Rt					
	Lft	0	0	2	0	16, 18, 19, 21
Salem	Rt	0	0	0	0	16, 18, 20, 22, 24
	Lft	—	—	—	—	—
Boston b	Rt	—	—	—	—	—
	Lft	0	0	3	0	7, 11—13, 15. 17, 19, 21, 23
Boston d	Rt	0	0	0	0	9, 11, 13, 15, 17, 19, 21, 23, 25
	Lft	0	0	0	0	9, 11, 13, 15, 17, 19, 21
Beaufort	Rt	0	0	0	0	?
	Lft	0	0	0	0	10, 12, 14, 16, 18
Texas	Rt	0	0	0	0	11, 13, 15, 17, 19, 21, 23, 25
	Lft	0	0	0	0	10, 12, 14, 16, 18, 20—22, 24, 26
Washington	Rt	—	—	—	—	—
	Lft	0	0	0	0	—

TABLE 7A.

SPINULES OF FEMUR AND TIBIA OF LEG V.

		FEMUR					TIBIA				
		d.	v.	cd.	cm.	cv.	d.	v.	cd.	cm.	cv.
Bermuda a	Rt. Lft.	0 0	0 0	0 0	0 0	6 4	0 0	0 0	6 5	4 4	7 5+1
Bermuda c	Rt. Lft.	0 —	4 —	0 —	0 —	0 —	0 —	0 —	6 —	3 —	4+1 —
Bermuda e	Rt. Lft.	— 0	— 0	— 0	— 0	— 3+1	— 0	— 0	— 3	— 1	— 2+1
France.....	Rt. Lft.	0 —	0 —	0 —	0 —	5+2 —	0 —	0 —	4 —	5 —	4+1 —
Salem.....	Rt. Lft.	0 —	0 —	0 —	0 —	5+1 —	0 —	0 —	5 —	7 —	5 —
Boston b..	Rt. Lft.	0 0	0 0	0 0	0 0	8+1 7+3	0 0	0 0	4 8	7 8	5+1 7+1
Boston d..	Rt. Lft.	0 0	0 0	0 0	0 0	5+1 6+3	0 0	0 0	6 3	5 3	5+1 3+1
Beaufort...	Rt. Lft.	0 0	0 0	0 0	0 0	4+2 5+1	2 2	0 0	8 5	0 6	5+1 3+1
Texas......	Rt. Lft.	0 0	0 0	0 0	0 0	5+1 4+1	0 0	0 0	7 7	3+1 7	5+1 6+1
Washington	Rt. Lft.	— 0	— 0	— 0	— 0	— 3+2	— 0	— 0	— 3	— 0	— 4+1

TABLE 7B.

SPINULES OF METATARSUS AND TARSUS I AND PEGS OF TARSUS II OF LEG V.

		METATARSUS			TARSUS I	TARSUS II
		d.	v.	cd.		
Bermuda a........	Rt....... Lft......	1 0	0 0	6 9	2 1	9, 10, 14, 15, 17, 20—22 10, 12, 14, 16, 18, 24
Bermuda c........	Rt....... Lft......	0 —	0 —	0 —	0 —	? —
Bermuda c........	Rt....... Lft......	— 0	— 0	— 0	— 0	— 9, 11, 13, 15, 17, 19, 21
France...........	Rt....... Lft......	0 —	0 —	5 —	0 —	12, 14, 18, 20, 22, 24 —
Salem............	Rt....... Lft......	0 —	0 —	0 —	0 —	16, 18, 20, 22, 24 —
Boston b..........	Rt....... Lft......	0 4	0 0	0 9	2 2	12, 14, 16, 18, 22, 24 12, 16, 18—20, 22, 24
Boston d..........	Rt....... Lft......	0 0	0 0	0 2	0 1	9, 11, 13, 15, 17, 19, 21 16, 18—22
Beaufort..........	Rt....... Lft......	1 0	0 0	7 5	4+2+1 3+1	12, 14, 16, 18, 20, 22 11, 15, 17, 19, 21, 23
Texas............	Rt....... Lft......	2 0	0 0	4 6	1 0	14, 18, 20, 22 12, 16, 18, 20, 22, 24, 26
Washington.......	Rt....... Lft......	— 0	— 0	— 3	— —	— 14, 16, 18, 20, 22

Table 8a.

Spinules of femur and tibia of leg VI.

		FEMUR					TIBIA				
		d.	v.	cd.	cm.	cv.	d.	v.	cd.	cm.	cv.
Bermuda a	Rt.	0	0	0	1	0	1	0	8	5	7
	Lft.	0	0	0	10	5+3	0	5	0	0	6+1
Bermuda c	Rt.	—	—	—	—	—	—	—	—	—	
	Lft.	0	7	0	0	0+5	7	0	12	0	6+1
Bermuda e	Rt.	—	—	—	—	—	—	—	—	—	—
	Lft.	0	0	0	0	4+2	0	0	5	2	2+1
France	Rt.	—	—	—	—	—	—	—	—	—	—
	Lft.	0	0	0	0	4+3	0	0	7	7	4+1
Salem	Rt.	—	—	—	0	7+1	0		—	5	5+1
	Lft.	—	—	—	—	—	—	0	0	—	—
Boston b	Rt.	0	0	0	0	7+2	1	1	7	8+1	4+1
	Lft.	0	0	0	0	7+1	1	6	8	6+1	7+1
Boston d	Rt.	0	0	0	0	5+1	2	2	5	3	6+1
	Lft.	0	0	0	0	3+3	1	0	6	5	5+1
Beaufort	Rt.	0	0	0	0	3+1	3	1	7	6	4+1
	Lft.	0	0	0	0	3+1	2	1	6	4	4+1
Texas	Rt.	—	—	—	—		—	—	—	—	—
	Lft.	—	—	—	—	—	—	—	—	—	—
Washington	Rt.	—	—	—	—	—	—	—	—	—	
	Lft.	0	2	0	0	4+1	0	0	5	1	5+1

Table 8b.

SPINULES OF METATARSUS AND TARSUS I AND PEGS OF METATARSUS OF LEG VI.

		METATARSUS			TARSUS I	TARSUS II
		d.	v.	cd.		
Bermuda a	Rt	9	0	15	4+0	9, 12, 13
	Lft	7	0	14	3+1	0
Bermuda c	Rt	—	—	—		—
	Lft	13	0	16	8+1+1+1	?
Bermuda e	Rt	—	—	—	—	—
	Lft	0	0	5	0	9, 11, 13, 15, 17, 19, 20
France	Rt	—	—	—	—	—
	Lft	4	0	11	6+2+2+2	16, 18, 20, 22
Salem	Rt	0	0+1	11	4	14, 16, 20, 22
	Lft					
Boston b	Rt	0	0	0	4	11, 15, 17, 19, 21, 23
	Lft	4	0	9	5	12, 14, 16, 18, 22, 24
Boston d	Rt	5	0	9	2	20, 22, 24
	Lft	7	0	9	3+1	15, 17, 19, 21
Beaufort	Rt	6	1	11	4+2+1	10, 12–14, 16, 18, 20, 22
	Lft	7	0	9	6+2+2+1	?
Texas	Rt	—	—	—	—	—
	Lft	—		—		
Washington	Rt	—	—	—	—	—
	Lft	5	0	6	0	18

TABLE 9A.

SPINULES OF FEMUR AND TIBIA OF LEG VII.

		FEMUR					TIBIA				
		d.	v.	cd.	cm.	cv.	d.	v.	cd.	cm.	cv.
Bermuda a	Rt.					4+4	5	5	10	5	7
	Lft.	0	5	0	0	3+3	5	5	9	1	7
Bermuda c	Rt.	0	1	0	0	0+3	2	0	5	0	4+1
	Lft.	0	2	0	3	0+3	3	0	8	4	6+1
Bermuda e	Rt.	—	—	—	—	—	—	—	—	—	—
	Lft.	—	—	—	—	—	—	—	—	—	—
France.....	Rt.	—	—	—	—	—	—	—	—	—	—
	Lft.	0	1	0	0	2+4	3	1	7	7	4+1
Salem.....	Rt.	?	?	?	?	?	7	?	?	?	?
	Lft.	—	—	—	—	—	—	—	—	—	—
Boston b..	Rt.	0	0	0	0	5+4	2	3	7	9+1	5
	Lft.	0	0	0	0	6+3	4	1	9	9	7+1
Boston d..	Rt.	0	2	0	0	3+3	4	3	7	5	5+1
	Lft.	0	3	0	0	4+5	0	4	7	6	5+1
Beaufort...	Rt.	0	0	0	0	2+3	5	1	7	6	5+1
	Lft.	—	—	—	—	—	—	—	—	—	
Texas......	Rt.	0	3	0	0	4+4	2	4	8	8	7+1
	Lft.	0	3	0	0	4+5	3	2	8	7	6+1
Washington	Rt.	—	—	—	—	—	—	—	—	—	—
	Lft.	—	—	—	—	—	—	—	—	—	—

TABLE 9B.

SPINULES OF METATARSUS AND TARSUS I AND PEGS OF METATARSUS II OF LEG VII.

		METATARSUS			TARSUS I	TARSUS II
		d.	v.	cd.		
Bermuda a........	Rt.......	14	2	16	13+2+1+1	0
	Lft......	17	0	15	10+2+1+1	0
Bermuda c.......	Rt.......	9	0	12	6+2+1+1	15, 17, 19
	Lft......	7	4	10	1+1	—
Bermuda e........	Rt.......	—	—	—	—	—
	Lft.......	—	—	—	—	—
France............	Rt.......	—	—	—	—	—
	Lft......	8	0	13	14+1+2+2	0
Salem............	Rt.......	10	0	?	5+0	18, 20
	Lft......	—	—	—	—	—
Boston b..........	Rt.......	11	1	11	5+2	—
	Lft......	11	0	18	8+1+1	17, 19, 21, 23
Boston d..........	Rt.......	10	0	15	6+1	20, 22, 24
	Lft......	12	0	11	6+1	16, 22
Beaufort..........	Rt.......	14	1	15	6+2+2+1	—
	Lft......	—	—	—	—	—
Texas............	Rt.......	11	0	11	6+2	18, 20, 22, 24
	Lft......	9	0	15	6+1	16, 18, 20, 24
Washington.......	Rt.......	—	—	—	—	—
	Lft......	—	—	—	—	—

TABLE 10A.

SPINULES OF FEMUR AND TIBIA OF LEG VIII.

		FEMUR					TIBIA				
		d.	v.	cd.	cm.	cv.	d.	v.	cd.	cm.	cv.
Bermuda a	Rt.	0	4	0	0+4	0	7	6	9	0	7
	Lft.	0	4	0	1+3	0	8	5	7	4+1	7
Bermuda c	Rt.	0	6	0	0	0+4	6	4	9	3	6+1
	Lft.	—	—	—	—	—	—	—	—	—	—
Bermuda e	Rt.	0	3	0	0+1	2+3	3	0	6	0	4+1
	Lft.	—	—	—	—	—	—		—	—	—
France	Rt.	—	—	—	—	—	—	—	—	—	—
	Lft.	0	7	0	0	0+4	9	3	12	6	7
Salem	Rt.	—	—	—	—	—	—	—	—		—
	Lft.	—	—	—	—	—	—	—	—	—	
Boston b	Rt.	0	5	0	0	1+3	4	2	7	9	6+1
	Lft.	0	3	0	0	5+4	5	4	9	9+2	6+1
Boston d	Rt.	0	7	0	0	1+3	5	5	6	3	5+1
	Lft.	—	—	—	—	—	—	—	—	—	—
Beaufort	Rt.	0	1	0	0	2+3	6	4	9	3	6+1
	Lft.	—	—	—	—	—	—	—	—	—	—
Texas	Rt.	0	4	0	0	3+4	5	5	0	0	7+1
	Lft.	0	6	0	0	1+5	4	4	8	8	6+1
Washington	Rt.	—	—	—	—	—	—	—	—	—	—
	Lft.	—	—	—	—	—	—	—	—	—	—

TABLE 10B.

SPINULES OF METATARSUS AND TARSUS I AND PEGS OF TARSUS II OF LEG VIII.

		METATARSUS			TARSUS I	TARSUS II
		d.	v.	cd.		
Bermuda a	Rt	18	2	19	13+3+2+1+1	0
	Lft	17	4	21	12+2+1+1	20, 18
Bermuda c	Rt	19	3	17	14+1+1+1+1	22, 24
	Lft	—	—	—	—	—
Bermuda e	Rt	9	0	12	1	12, 14, 16, 18, 20
	Lft	—	—	—	—	—
France	Rt	—	—	—	—	—
	Lft	17	5	19	17+3+3+2	0
Salem	Rt	—	—	—	—	—
	Lft	—	—	—	—	—
Boston b	Rt	14	1	15	11+1+1	15, 21, 23
	Lft	12	0	20	10+1+1	17, 19, 21, 23
Boston d	Rt	17	1	?	9+1+1	15, 17, 19, 21
	Lft	—	—	—	—	—
Beaufort	Rt	19	3	17	9+2+2+2+2+1	0
	Lft	—	—	—	—	—
Texas	Rt	13	2	16	11+2+1	18, 20, 22, 24
	Lft	16	0	15	8+1	18, 20, 22
Washington	Rt	—	—	—	—	—
	Lft	—	—	—	—	—

TABLE 11A.

SPINULES OF FEMUR AND TIBIA OF LEG IX.

		FEMUR					TIBIA				
		d.	v.	cd.	cm.	cv.	d.	v.	cd.	cm.	cv.
Bermuda a	Rt.	0	7	0	0	1+5	7	6	10	2	[illegible]
	Lft.	0	8	0	0	2+3	12	7	8	2+3	12
Bermuda c	Rt.	—	—	—	—	—	—	—	—	—	—
	Lft.	0	4	0	0	0+4	7	0	9	0	5−1
Bermuda e	Rt.	—	—	—	—	—	—	—	—	—	—
	Lft.	—	—	—	—	—	—	—	—	—	—
France	Rt.	—	—	—	—	—	—	—	—	—	—
	Lft.	—	—	—	—	—	—	—	—	—	—
Salem	Rt.	—	—	—	—	—	—	—	—	—	—
	Lft.	—	—	—	—	—	—	—	—	—	—
Boston b	Rt.	0	6	0	0	3+4	8	6	9	8+3	7−1
	Lft.	0	6	0	0	5+4	6	5	10	8+4	6−1
Boston d	Rt.	—	—	—	—	—	—	—	—	—	—
	Lft.	—	—	—	—	—	—	—	—	—	—
Beaufort	Rt.	—	—	—	—	—	—	—	—	—	—
	Lft.	—	—	—	—	—	—	—	—	—	—
Texas	Rt.	0	6	0	0	0+4	7	7	10	6	8−1
	Lft.	—	—	—	—	—	—	—	—	—	—
Washington	Rt.	—	—	—	—	—	—	—	—	—	—
	Lft.	—	—	—	—	—	—	—	—	—	—

TABLE 11B.

SPINULES OF METATARSUS AND TARSUS I AND PEGS OF TARSUS II OF LEG IX.

		METATARSUS			TARSUS I	TARSUS II
		d.	v.	cd.		
Bermuda a	Rt.	23	5	21	17+3+1+1+1	0
	Lft.	23	9	26	14+3+1+1+1	0
Bermuda c	Rt.	—	—	—	—	—
	Lft.	15	1	19	16+v+v+o+1	19
Bermuda e	Rt.	—	—	—	—	—
	Lft.	—	—	—	—	—
France	Rt.	—	—	—	—	—
	Lft.	—	—	—	—	—
Salem	Rt.	—	—	—	—	—
	Lft.	—	—	—	—	—
Boston b	Rt.	17	3	20	13+1+1	0
	Lft.	20	2	18	15+1+1	23
Boston d	Rt.	—	—	—	—	—
	Lft.	—	—	—	—	—
Beaufort	Rt.	—	—	—	—	—
	Lft.	—	—	—	—	—
Texas	Rt.	—	—	—	—	—
	Lft.	17	4	21	11+2+1+1	0
Washington	Rt.	—	—	—	—	—
	Lft.	—	—	—	—	—

Table 12a.

SPINULES OF FEMUR AND TIBIA OF LEG X.

		FEMUR					TIBIA				
		d.	v.	cd.	cm.	cv.	d.	v.	cd.	cm.	cv.
Bermuda a	Rt.	0	5	0	0	0+3	8	7	10	1	8
	Lft.	0	6	0	0	0+4	12	8	11	3+3	7
Bermuda c	Rt.	0	5	0	0	0+3	12	8	15	1+2	9+1
	Lft.	0	8	0	0	0+4	7	0	9	0	5+1
Bermuda e	Rt.	0	6	0	0	0+2	0	3	8	0	5+1
	Lft.	—	—	—	—	—	—		—	—	—
France.....	Rt.	0	7	0	0	0+3	7	4	9	0+3	4+1
	Lft.	0	4	0	0	0+3	8	5	7	2	3+1
Salem.....	Rt.	0	9	0	2	0+4	10	6	10	6+2	8
	Lft.	—	—	—	—	—	—	—		—	—
Boston b..	Rt.	0	8	0	0	1+4	8	8	12	7+4	6+1
	Lft.	0	6	0	0	0+3	10	8	11	6+4	6+1
Boston d..	Rt.	—	—	—	—	—	—	—	—	—	—
	Lft.	—	—	—	—	—	—	—	—	—	—
Beaufort...	Rt.	—	—	—	—	—	—	—	—	—	—
	Lft.	—	—	—	—	—	—	—	—	—	—
Texas......	Rt.	0	9	0	0	1+3	9	8	9	8+2	7+2
	Lft.	0	6	1	0	0+4	9	7	8	9	8+1
Washington	Rt.	—	—	—	—	—	—	—	—	—	—
	Lft.	0	8	0	0	0+2	8	6	9	0	5+1

Table 12b.

SPINULES OF METATARSUS AND TARSUS I AND PEGS OF TARSUS II OF LEG X.

		METATARSUS			TARSUS I	TARSUS II
		d.	v.	cd.		
Bermuda a........	Rt.......	28	8	27	20+4+1+1+1+1	0
	Lft......	20	6	23	20+3+2+2+0+1	0
Bermuda c........	Rt.......	19	8	20	14+3+2+1+1	0
	Lft......	15	1	19	14+3+1+0+1	0
Bermuda e........	Rt.......	28	0	16	8+1+0	17, 19
	Lft......	—	—	—	—	—
France............	Rt.......	16	4	22	16+3+3+1+2+1	0
	Lft......	18	3	23	16+3+3+2	0
Salem............	Rt.......	23	5	20	14+2+1+2+1	0
	Lft......	—	—	—	—	—
Boston b..........	Rt.......	22	4	19	18+2+1+1+1	0
	Lft......	25	5	22	15+2+1+1	0
Boston d..........	Rt.......	—	—	—	—	—
	Lft......	—	—	—	—	—
Beaufort..........	Rt.......	—	—	—	—	—
	Lft......	—	—	—	—	—
Texas............	Rt.......	18	6	20	17+3+1+1	0
	Lft......	18	6	21	20+2+2+2	0
Washington.......	Rt.......	—	—	—	—	—
	Lft......	19	1	25	18+2+1+1+1+1	0

TABLE 13A.

SPINULES OF FEMUR AND TIBIA OF LEG XI.

		FEMUR					TIBIA				
		d.	v.	cd.	cm.	cv.	d.	v.	cd.	cm.	cv.
Bermuda a	Rt.	0	7	0	0	0+6	14	8	12	1	8
	Lft.	0	6	0	0	0+4	10	8	12	0	9
Bermuda c	Rt.	—	—	—	—	—	—	—	—	—	—
	Lft.	0	12	0	0	0+4	19	9	15	3+2	9+1
Bermuda e	Rt.	0	7	0	0	0+3	7	4	8	0	6+1
	Lft.	0	7	0	0+1	0+1	10	6	8	0	5+1
France	Rt.	0	8	0	0	0+4	10	6	10	0	4+1
	Lft.	0	5	0	0	0+5	9	6	9	2	4+1
Salem	Rt.	0	8	0	1	0+4	14	8	10	4+2	7
	Lft.	—	—	—	—	—	—	—	—	—	—
Boston b	Rt.	0	6	0	0	0+3	11	7	13	6+4	7+2
	Lft.	0	6	0	0	0+3	8	8	12	4+4	7+1
Boston d	Rt.	—	—	—	—	—	—	—	—	—	—
	Lft.		—	—	—	—	—	—	—	—	—
Beaufort	Rt.	0	8	0	0	0+4	12	9	11	3+2	8+1
	Lft.	—	—	—	—	—	—	—	—	—	—
Texas	Rt.	0	8	0	0	1+4	7	10	10	6+4	8+1
	Lft.	—	—	—	—	—	—	—	—	—	—
Washington	Rt.	—	—	—	—	—	—	—	—	—	—
	Lft.	0	5	0	0	1+2	9	7	11	0	7+1

TABLE 13B.

SPINULES OF METATARSUS AND TARSUS I AND PEGS OF TARSUS I OF LEG XI.

		METATARSUS			TARSUS I	TARSUS II
		d.	v.	cd.		
Bermuda a	Rt	33	11	26	26+3+2+1+1	0
	Lft	30	11	27	24+4+2+2+1	—
Bermuda c	Rt	—	—	—	—	—
	Lft	—	—	—	—	—
Bermuda e	Rt	16	1	13	6+0	0
	Lft	16	1	17	9+1	0
France	Rt	19	6	27	22+3+2+2+0+1+2	0
	Lft	25	4	26	16+3+3+3+2+1	0
Salem	Rt	28	6	24	17+2+2+1	0
	Lft	28	8	24	20+1+2+2	0
Boston b	Rt	25	9	25	20+3+1+1	0
	Lft	24	8	29	15+2+1+1	0
Boston d	Rt	—	—	—	—	—
	Lft	—	—	—	—	—
Beaufort	Rt	29	10	26	28+4+3+3+2+1	0
	Lft	—	—	—	—	
Texas	Rt	25	9	23	20+2+2	0
	Lft	—	—	—	—	—
Washington	Rt	—	—	—	—	—
	Lft	26	5	24	24+4+2+1+1+1+1	0

TABLE 14A.

SPINULES OF FEMUR AND TIBIA OF LEG XII.

	FEMUR					TIBIA				
	d.	v.	cd.	cm.	cv.	d.	v.	cd.	cm.	cv.
Bermuda a {Rt. Lft.	0 0	9 8	0 0	0 2	0+6 0+5	16 12	13 11	14 13	1 2+4	12 8
Bermuda c {Rt. Lft.	0 —	5 —	0 —	0 —	0 —	14 —	10 —	14 —	0+3 —	8+1 —
Bermuda e {Rt. Lft.	— —	— —	— —	— —	— —	— —	— —	— —	— —	— —
France...... {Rt. Lft.	— —	— —	— —	— —	— —	— —	— —	— —	— —	— —
Salem...... {Rt. Lft.	0 —	1 —	1 —	2 —	0+5 —	15 —	12 —	15 —	6+4 —	10 —
Boston b.. {Rt. Lft.	0 0	7 8	0 0	0 0	0+3 0+5	12 13	11 9	15 13	0+4 5+3	9+1 7+1
Beaufort... {Rt. Lft.	— —	— —	— —	— —	— —	— —	— —	— —	— —	— —
Texas...... {Rt. Lft.	— —	— —	— —	— —	— —	— —	— —	— —	— —	— —
Washington {Rt. Lft.	— —	— —	— —	— —	—	— —	— —	— —	— —	— —

TABLE 14B.

SPINULES OF METATARSUS AND TARSUS I AND PEGS OF TARSUS II OF LEG XII.

	METATARSUS			TARSUS I	TARSUS II
	d.	v.	cd.		
Bermuda a........ {Rt....... Lft......	34 28	15 16	33 29	30+3+2+2+1+1 28+2+3+3+3+1	0 0
Bermuda c........ {Rt....... Lft......	28 —	10 —	22 —	22+5+2+2+2+2+1 —	0 —
Bermuda e........ {Rt....... Lft......	— 19	— 1	— 13	— 11+0+1	— 0
France.......... {Rt....... Lft......	— —	— —	— —	— —	— —
Salem.......... {Rt....... Lft......	30 —	7	29 —	26+2+2 —	0 —
Boston b........ {Rt....... Lft......	27 30	6 8	31 30	21+3+3+1+2 22+3+2+2+1+1	0 0
Beaufort.......... {Rt....... Lft......	— —	— —	— —	— —	—
Texas.......... {Rt....... Lft......	— —	— —	— —	— —	—
Washington....... {Rt....... Lft......	— —	— —	— —	— —	— —

TABLE 15A.

SPINULES OF FEMUR AND TIBIA OF LEG XIII.

		FEMUR					TIBIA				
		d.	v.	cd.	cm.	cv.	d.	v.	cd.	cm.	cv.
Bermuda a	Rt.	0	12	0	4	0+7	21	13	15	0	14
	Lft.	—	—	—	—	—	—	—	—	—	—
Bermuda c	Rt.	—	—	—	—	—	—	—	—	—	—
	Lft.	—	—	—	—	—	—	—	—	—	—
Bermuda e	Rt.	—	—	—	—	—	—	—	—	—	—
	Lft.	—	—	—	—	—	—	—	—	—	—
France	Rt.	—	—	—	—	—	—	—	—	—	—
	Lft.	0	7	0	0	2+4	16	10	14	0+2	8+1
Salem	Rt.	0	10	0	5	2+6	19	14	18	12+4	14
	Lft.	—	—	—	—	—	—	—	—	—	—
Boston b.	Rt.	0	8	0	0	0+5	12	13	16	4+4	8+1
	Lft.	0	8	0	0	2+5	15	10	14	5+4	9+1
Beaufort	Rt.	—	—	—	—	—	—	—	—	—	—
	Lft.	—	—	—	—	—	—	—	—	—	—
Texas	Rt.	0	9	0	0	1+7	18	14	13	7+4	12+1
	Lft.	0	12	2	2	1+5	15	15	15	13+2	11+1
Washington	Rt.	—	—	—	—	—	—	—	—	—	—
	Lft.	0	5	0	0	1+2	12	9	6	0+3	5+1

TABLE 15B.

SPINULES OF METATARSUS AND TARSUS I AND PEGS OF TARSUS II OF LEG XIII.

		METATARSUS			TARSUS I	TARSUS II
		d.	v.	cd.		
Bermuda a	Rt.	36	16	33	35+4+4+2+2+1	—
	Lft.	—	—	—	—	—
Bermuda c	Rt.	—	—	—	—	—
	Lft.	—	—	—	—	—
Bermuda e	Rt.	—	—	—	—	—
	Lft.	—	—	—	—	—
France	Rt.	—	—	—	—	—
	Lft.	20	12	30	25+3+2+3+2+1	0
Salem	Rt.	30	12	28	29+3+1	0
	Lft.	—	—	—	—	—
Boston b	Rt.	28	9	30	22+3+3+2+1	0
	Lft.	33	8	31	25+3+2+1	0
Beaufort	Rt.	—	—	—	—	—
	Lft.	—	—	—	—	—
Texas	Rt.	25	14	29	26+2+3+1+1	0
	Lft.	25	13	33	26+4+3+1+1	0
Washington	Rt.	—	—	—	—	—
	Lft.	28	7	29	22+5+5+2+0+1	0

Table 16a.

SPINULES OF FEMUR AND TIBIA OF LEG XIV.

		FEMUR					TIBIA				
		d.	v.	cd.	cm.	cv.	d.	v.	cd.	cm.	cv.
Bermuda a	Rt.	0	4	16	6	14+7	24	14	19	3	13
	Lft.	0	12	8	17	2+6	21	13	17	4+4	14
Bermuda c	Rt.	—	—	—	—	—	—	—	—	—	—
	Lft.	—	—	—	—	—	—	—	—	—	—
Bermuda e	Rt.	—	—	—	—	—	—	—	—	—	—
	Lft.	—	—	—	—	—	—	—	—	—	—
France…..	Rt.	—	—	—	—	—	—	—	—	—	—
	Lft.	0	11	0	3	13+4	16	12	13	0+2	11+1
Salem…..	Rt.	—	—	—	—	—	—	—	—	—	—
	Lft.	—	—	—	—	—	—	—	—	—	—
Boston b..	Rt.	0	10	6	0	13+4	19	15	19	9+4	13+4
	Lft.	0	10	6	0	10+6	15	10	14	5+4	9+1
Beaufort…	Rt.	—	—	—	—	—	—	—	—	—	—
	Lft.	—	—	—	—	—	—	—	—	—	—
Texas……	Rt.	—	—	—	—	—	—	—	—	—	—
	Lft.	0	10	7	0	15+6	19	14	18	11+5	12+1
Washington	Rt.	—	—	—	—	—	—	—	—	—	—
	Lft.	—	—	—	—	—	—	—	—	—	—

Table 16b.

SPINULES OF METATARSUS AND TARSUS I OF LEG XIV.

		METATARSUS			TARSUS I	TARSUS II
		d.	v.	cd.		
Bermuda a………	Rt…….	39	18	35	30+4+2+2+2+2+2	0
	Lft……	38	20	33	?	0
Bermuda c………	Rt…….	—	—	—	—	—
	Lft……	—	—	—	—	—
Bermuda e………	Rt…….	—	—	—	—	—
	Lft……	—	—	—	—	—
France…………	Rt…….	—	—	—	—	—
	Lft……	28	9	30	26+3+3+3+2+1	0
Salem…………	Rt…….	—	—	—	—	—
	Lft……	—	—	—	—	—
Boston b……….	Rt…….	33	15	28	24+2+2+1	0
	Lft……	32	10	31	25+3+0+1+1	0
Beaufort……….	Rt…….	—	—	—	—	—
	Lft……	—	—	—	—	—
Texas………….	Rt…….	—	—	—	—	—
	Lft……	34	13	31	27+3+2+1	0
Washington…….	Rt…….	—	—	—	—	—
	Lft……	—	—	—	—	—

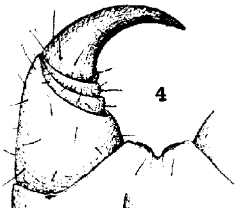
EXPLANATION OF PLATE XXIX

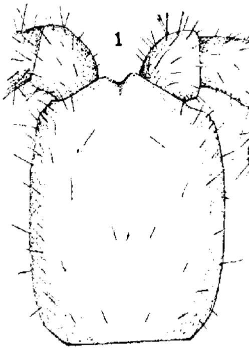
Hydroschendyla submarina (Grube). Male.

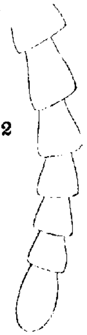
Fig. 1. Cephalic plate.
Fig. 2. Distal portion of antenna in outline.
Fig. 3. Tip of distal article of antenna more highly magnified.
Fig. 4. Anterior border of prosternum with right prehensor.
Fig. 5. Caudal end with anal legs, ventral view.

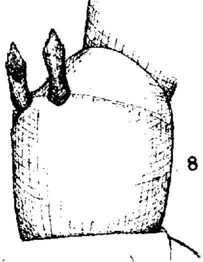
Lithobius provocator Pocock.

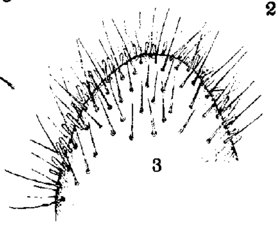
Fig. 6. Anterior border of prosternum showing position of spine, with tooth interpolated in diastema of right half.
Fig. 7. The same, with tooth interpolated in diastema on both sides and an extra ectal tooth on left half.
Fig. 8. Basal joint of female gonopod showing form of basal spines.

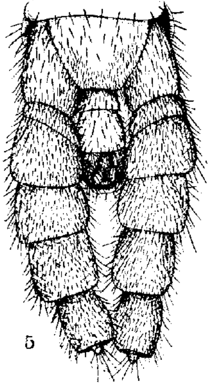

4

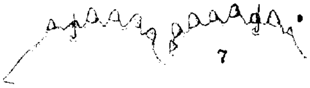

1

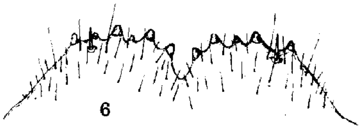

2


8


3


5


7


6

R. V. Chamberlin

REVIEW OF THE NEARCTIC TETANOCERIDÆ.*

A. L. MELANDER, Pullman, Washington.

The flies of this family are commonly encountered in meadows and along marshy shores, some species being quite abundant. Their delightful colors, with prevailingly reddish body and frequently pictured wings, make them preferred insects with collectors. As their nomenclature has passed through such revolutionary changes since the publication of Aldrich's Catalog, fifteen years ago, the writer prepared a synopsis of the group to help with their identification. As a curious coincidence, about six months after the manuscript was sent away for publication, an unexpected revision of the same group by E. T. Cresson, Jr., appeared in the Transactions of the American Entomological Society. The publication of several of the new genera and species diagnosed in my manuscript made it necessary to recall the copy from the editor and to revise it. To make the tables complete, Cresson's new genera and species and additional localities cited by him have been incorporated. I am also indebted to Cresson for the information concerning the prior use of *Euthycera* Latreille over *Lunigera* Hendel. Aside from these changes, the nomenclature previously decided upon I have retained. A comparison of the two papers will disclose a few instances where we do not agree. Most of these concern the identification of European species. It is interesting to note that independently, without knowing of the other's work, we both arrived at the same conclusions so many times. For example, Mr. Cresson's new genera, *Hoplodictya* and *Dictyomyia*, based on previously known species, were likewise described as new by me.

Mr. Cresson's studies were based mainly on Eastern material, while the present paper, dealing entirely with my own collection, is based principally on Western forms. The combination of the two, therefore, brings to light so much new material and so many changes in nomenclature that the list in Aldrich's Catalog now seems antiquated. Aldrich listed fifty species and seven genera from north of Mexico as coming in this family. Of these, six species have been dropped as unrecognizable, eight have been relegated to synonymy and twenty-four have been assigned different generic names, leaving but twelve remaining unchanged. In the following pages are given synoptic keys to twenty-two genera, eighty-nine species and eight varieties. Cresson's paper enumerates fifty-five species and seven varieties. distributed among twenty genera.

---

* Contribution from the Zoölogy Laboratory of the State College of Washington.

The family designation, Tetanoceridæ, has been chosen instead of the name Sciomyzidæ, because *Tetanocera* Dumeril, 1798, antedates *Sciomyza* Fallen, 1820. Even the genera *Dictya* Meigen, 1803, and *Sepedon* Latreille, 1804, have claim for recognition prior to *Sciomyza*. The forms grouped about *Dryomyza* are sometimes segregated as a distinct family, the Dryomyzidæ, but while they have a somewhat characteristic habitus, their differences are hard to express in terms of family value.

In the following pages are given in dichotomic form identification tables for the genera and species of Tetanoceridæ known from north of Mexico. Only in cases where genera or species are not listed in Aldrich's Catalog a bibliography has been included; where species have been assigned to genera other than in the Catalog the former name is given in parenthesis; page references to Cresson's paper are quoted following his name. Localities represented in my collection are designated by an asterisk (*).

The valves of the hypopygium, called paramera by Hendel, sometimes afford splendid characters for identification. The genitalia must be disengaged in order to obtain a view of these appendages, which in old specimens can be readily accomplished by relaxing and pulling down the hypopygium. Examination of the valves, especially in species of *Tetanocera*, where they are large, affords a ready means of certain identification. It may be that such an examination of the American specimens referred to *T. elata*, *ferruginea* and *silvatica* will disclose that these European species do not occur in this country.

With reference to the identification of other European species, the extended distribution of some, such as *Neuroctena anilis*, *Melina nana* and *grisescens*, has long been known. Flies that have so distinctive and frequent a habitat as the marshy shores of ponds often have a wide distribution. The prevalence of European species on the Pacific slope is not surprising. Notwithstanding opinions to the contrary, I feel it a safer course to use existing European names for such species rather than to describe as new forms that are specifically indistinguishable.

Table of the Genera of Tetanoceridæ.

Clypeus prominent, not retractable with the infolding of the proboscis, usually chitinized and narrow; first vein ending beyond middle of wing; femora finely pilose, with bristles undeveloped. (Dryomyzinæ)........ 3
Clypeus vestigial, rarely chitinized, not touching oral margin when proboscis is extended; first vein ending at middle of wing; femora setulose, their bristles developed; species occurring in moist meadows and along the shores of ponds.. 2

2. A distinct bristle present above base of front coxæ (indistinct in *Melina pubera*); front without differentiated median polished stripe, except in *Ditænia*. (Sciomyzinæ).. 6
Propleural bristle wanting; front with a distinct polished median stripe, rarely subshining. (Tetanocerinæ).................................... 9

3. Wings with costal spines; eyes small, the cheeks broader than the eyes; face not excavated in profile; antennæ not reaching halfway to the mouth-opening; scutellum flat and setulose; pollinose maritime species. *Helcomyza* Curtis
Costa not spinose; eyes deeper than the cheeks; face shorter, and excavated in profile, the antennæ nearly attaining oral margin; scutellum convex and bare.. 4

4. Dorsocentrals extending in front of the imperfect suture; 6 scutellars; 2 fronto-orbitals; underside of proboscis with saucer-like base; opaque black glaucous pubescent maritime species............ *Heteromyza* Fallen
Transverse suture distinct; 2 dorsocentrals present; 4 scutellars; 1 fronto-orbital; proboscis narrow; middle tibiæ with posterior bristles; subshining reddish woodland species.................................... 5

5. Veins bare, hairs of first vein microscopic................ *Dryomyza* Fallen
First vein closely and obviously hairy................ *Neuroctena* Rondani

6. Front tibiæ with 2 approximate preapical bristles; hind femora of both sexes beneath typically with an outstanding bristle.................... 7
Front tibiæ with 1 preapical bristle; at most the hind femora of male short-spinose or hairy.. 8

7. Arista densely short white plumose; face tuberculate above. *Oidematops* Cresson
Arista black and long-plumose; face not tuberculate....... *Sciomyza* Fallen

8. Small, shining black species with polished front and narrow cheeks; legs yellow, the front pair largely black and with lengthened coxæ. *Pteromicra* Lioy
Yellow to gray, opaque or subshining, never shining black species, with broader cheeks and shorter front coxæ.................. *Melina* Desvoidy

9. Scutellum with 4 bristles, (2 in *Hemitelopteryx johnsoni*); chætotaxy better developed than in *Sepedon;* hind femora not much longer than the abdomen; second antennal joint shorter or at least not longer than third, longer only in *Dictyomyia*.................................... 10
Scutellum with 2 bristles, no ocellar, humeral, presutural, prescutellar, pleural or abdominal bristles; hind femora greatly surpassing the abdomen; second antennal joint longer than third; lunule free. *Sepedon* Latreille

10. Third antennal joint oval, three times the length of the second; front more or less constricted toward antennæ.............................. 11
Third antennal joint rarely oval, usually more or less triangular, flattened or excised above, the second joint relatively much longer; sides of front nearly parallel.. 13

11. Slender species with short and narrow wings; two scutellars, one dorsocentral; arista densely short black-plumose.......*Hemilelopteryx* Cresson
Wings larger, surpassing the abdomen; four scutellars.....................12

12. One preapical bristle on hind tibiæ; hypopygium moderate, fifth sternite simple; hind femora closely spinose beneath; first vein ending beyond anterior crossvein; cheeks at least half as wide as eye....*Renocera* Hendel
Two preapical bristles on hind tibiæ; hypopygium enlarged, fifth sternite pointed; first vein ending opposite or before anterior crossvein; cheeks not exceeding one-third the eye.....................*Antichæta* Haliday

13. At least meso- and pteropleuræ with macrochætæ; face nearly vertical, its central part with nearly parallel sides; wings brown, with paler spots; eyes vertically oval..14
No distinct macrochætæ on pleuræ, sometimes setulæ present; face more or less receding and divergent below; 2 reclinate fronto-orbitals........15

14. Two fronto-orbitals, the anterior proclinate, 1 sternopleural, 3 dorsocentrals; second antennal joint with a forcipate pair of stout bristles; fourth tergite of ♂ narrow........................*Hoplodictya* Cresson
One fronto-orbital, 0 sternopleural, 2 dorsocentrals; second antennal joint with only ordinary setæ; fifth tergite narrow.........*Dictya* Meigen

15. Arista almost bare; hind crossvein strongly bent, S-like; scattered setulæ on meso-, sterno- and pteropleuræ; wings with few markings; lunule visible..16
Arista pubescent or plumose; hind crossvein sinuous or arcuate; 2 or 3 dorsocentrals..17

16. No vallar bristles, i. e., on callosity beneath calypteres, 0 presutural, 0 prescutellar, 1 dorsocentral; extensor femoral bristles weak.
Hedroneura Hendel
Vallar bristles present, 1 presutural, 1 prescutellar, 2 dorsocentrals; front femora bristly above.............................*Elgiva* Meigen

17. First vein ending almost opposite anterior crossvein; interfrontal stripe depressed and relatively narrow; 2 dorsocentrals; edges of second antennal joint nearly parallel..18
First vein ending far before anterior crossvein; interfrontalia convex, five times as broad as periorbit; 3 dorsocentrals; second antennal joint compressed, obconical, half as long as the scimiter-shaped third joint, arista plumose; all pleural sclerites setulose; wings brown, with rounded clear spots..............................*Poecilographa* Melander

18. Meso- and pteropleuræ entirely bare, no vallar bristles, only the sternopleuræ setulose..19
Meso- and pteropleuræ as well as sternopleuræ bearing setulæ, vallar bristles (i. e., on callosity beneath calypteres) present; eyes transversely oval; fifth tergite of male wide; lunule covered; wings reticulate...21

19. Lunule exposed; wings brown, with rounded clear spots..................20
Lunule more or less covered; wings nearly uniformly colored, the crossveins clouded, sometimes with short transverse marks, but no round clear spots; eyes round; arista black-plumose; fifth tergite wide.
Tetanocera Dumeril

20. Second antennal joint slender, as in *Sepedon*, much longer than the third; eyes vertically oval; arista white-pubescent; wings abnormally wide; fifth tergite ♂ wide; face tuberculate beneath antennæ..*Dictyomyia* Cresson
Second antennal joint quadrate and broad, scarcely longer than third; eyes round; arista white-plumose; fifth tergite ♂ retractile; face carinate just beneath antennæ.......................*Euthycera* Latreille

21. Arista loosely black-plumose; interfrontal depression not polished.
Trypetoptera Hendel
Arista closely white-pubescent or short-plumose; interfrontal stripe shining...*Limnia* Desvoidy

Heteromyza Fallen.

Heteromyza Fallen, Dipt. Suec. Heteromyz, 2 (1820). Not *Heteromyza* of authors (Helomyzidæ) which is *Heteromyiella* Hendel, 1910.
Heterostoma Rondani, Prodr. Dipt. Ital. I, 104 (1856).
Heterocheila Rondani, Prodr. Dipt. Ital. II, 13 (1857).
Oedoparea Loew, Zts. Entom. Breslau, XIII, 10 (1859).
Exocheila Rondani, Prodr. Dipt. Ital. VII, Sciomyz, 72 (1866).

Black, only the halteres yellow; front, mesonotum and scutellum brown pruinose, occiput, pleuræ, abdomen and legs blue-gray; veins and margins of calypteres black; 5 dorsocentrals; body and legs of male with long black hairs; 6-7 mm. Alaska, Washington.* (*Oedoparea*)...**glauca** Coquillett

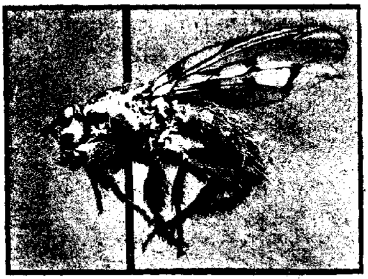
Helcomyza Curtis.

Helcomyza Curtis, Brit. Ent. 68 (1825).
Actora Meigen, Syst. Beschr. V, 403 (1826).

Helcomyza mirabilis n. sp.

Female—Length 7–11 mm. Face, cheeks and lower occiput thickly overlaid with silvery white pollen, front convex and golden-olivaceous pollinose, two rather small fronto-orbital bristles, antennæ black, third joint orbicular, arista short, bare and black, mouthparts black, head with fine hairs which are short and proclinate on the front and outstanding on the cheeks. Thorax thickly coated with pollen, olivaceous gray on anterior mesonotum, usually purer gray about the scutellum, vaguely marked with seal-brown vittæ comprising a central pair stronger at each end and a broader, shorter and darker lateral pair interrupted along the transverse suture, most of the setulæ arising from a brown dot, pleuræ cinereous, a velvet-black spot around the anterior spiracle; chætotaxy as follows: 1 humeral, 2 notopleural, 1 presutural, 1 supra-alar, 2 intra-alar, 3 dorsocentral, 2 prescutellar, 4 scutellar, 0 pleural except 1 pro-pleural and a superior row of 5 spernopleural bristles, mesonotum and scutellum setulose, pleuræ bare except for rather dense and long outstanding fine black hairs covering the sternopleuræ. Abdomen cinereous, with fine black hair, seven segments visible. Legs hairy, the femora piceous and cinereous pollinose, tibiæ brown, tarsi brown at base, apically black, front femora with six flexor hairs longer than the rest, middle tibiæ with about ten rather strong bristles irregularly placed in addition to the usual preapical crown of bristles; front and hind tibiæ with single preapical bristle. Halteres and calypteres yellow. Wings hyaline, veins fine and black, base of costal cell and all crossveins margined with strong infumation, a brown spot crossing the middle of the first basal cell, costal sections beyond humeral vein proportioned 4 : 4 : 4 : 3 : 2, third and fourth veins drawn together at anterior crossvein, which is located at five-ninths the length of the discal cell, anal vein straight, ending under middle of discal cell.

Male—10–13 mm. Hairs of palpi, cheeks, body and legs much longer, those of sternopleuræ, abdomen and femora tipped with golden; 1 dorsocentral, prescutellars reduced, propleuræ of largest specimens with a pencil of hairs, no distinct sternopleurals, no preapicals, bristles of middle tibiæ more numerous, inside of front and hind tibiæ and plantar surface of their tarsi with dense dark-orange sole.



Helcomyza mirabilis n. sp. Male.
(Enlarged 3 diameters.)

The first specimens of this remarkable species were discovered in May, 1917, actively flying over the dry sands along the seabeach near Ilwaco, Washington. Additional specimens were taken on later visits to the same locality in July and August of the same year, and in 1918, with the help of Anthony Spuler and Miss Orilla E. Miner, enough specimens from the same locality were captured to bring the collection up to eighty individuals. The flies were difficult to catch, being alert and quick to take to the wing, and with the sea breeze blowing, were carried many feet along the sands before they would alight. The males vary greatly in stature and vestiture, the largest specimens being quite shaggy. This fine species is one of the largest of the American Acalypteræ.

Actora ferruginea Walker, from Nova Scotia, is omitted from the present discussion, as it clearly does not belong to the Tetanoceridæ.

Dryomyza Fallen.

Dryomyza convergens Walker, from Nova Scotia, is omitted from the following table, since it almost certainly belongs elsewhere. It has the thorax trivittate, the posterior crossvein clouded, the arista downy, and the abdomen furnished with short black bristles.

Wings with marginal cell, apex and crossveins distinctly marked with dark brown; first posterior cell two-thirds as wide as the submarginal along the costa; no distinct posterior setæ on middle tibiæ. Idaho,* Alaska*.......................... **maculipennis**, n. sp.
Wings not pictured; middle tibiæ with distinct posterior setæ............ 2
2. Third vein recurved, ending beyond wing-tip, the submarginal cell twice as wide as the first posterior along the costa; pilosity of arista very fine and rather sparse. N. Y.,* B. C. (Cresson, 34).......... **dayi** Cresson
Third vein less recurved, the first posterior cell two-thirds as wide as the submarginal along the costa; arista blackish and distinctly pilose; hypopygium large. Vt.*.............................. **ferruginea**, n. sp.

Dryomyza maculipennis new species.

Length 5-7 mm. Entirely shining luteous, the tarsi black, front opaque orange, pubescence fine, of front and notum blackish, of sternopleuræ and abdomen long and yellow, of tarsi blackish. Arista loosely hairy, black except at base. Three hair-like black sternopleurals. Middle tibiæ with at most one posterior seta. Veins yellow, but black around the infuscations which include the costal cell, the apex of the wing and the anterior, posterior and anal crossveins, anal crossvein reflexed, third vein gently curving back, ending just behind the wing-tip, parallel with the fourth vein, costal sections beyond the humeral crossvein proportioned 3 : 4 : 5 : 3 : 2.

Nineteen specimens; Avon, Moscow, Waha, Idaho;* Douglas, Alaska* (Jenne).

Dryomyza ferruginea new species.

Male—Length, 5 mm. Ferruginous, shining, middle of abdomen brown, front opaque reddish yellow, pubescence fine, abundant, colored as in the other species. Two fronto-orbitals; antennæ reddish. Two long black sternopleural hairs. Hypopygium large, the paramera hook-like, the penis thick, black, and when exserted curved around the right side of the hypopygium. Middle tibiæ with two or three small posterior setæ, less distinct in the female. Halteres testaceous. Wings with a yellowish tinge, veins yellowish brown, a slight indication of clouding at the apex and about the anterior and posterior crossveins, third vein gently curved, parallel with the fourth and ending at the wing-tip, costal sections proportioned 5 : 5 : 6 : 4 : 3, anterior crossvein nearly transverse.

Two specimens. Lyndon, Vermont,* August 22, 1900.

Neuroctena Rondani.

First vein entirely hairy; yellow species.................................. 2
First vein bare toward base; wings uniformly infumated; arista uniformly pubescent; reddish species with blackened abdomen. Col., N. Mex., Mont.,* Id.,* Wash.,* B. C........................ **fumida** Coquillett
2. Crossveins and apices of third and fourth veins clouded; arista nearly bare; a small black spot beneath calypteres. Eur.;* Mass.,* N. H., Ct., Vt.,* N. Y.,* N. J., Queb.,* Ont.,* Mich., Wis., S. D. (Aldrich), Wash.,* Or. (Cole), B. C.,* Alaska.* (*Dryomyza pallida* Day). **anilis** Fallen
Veins not clouded except faintly about posterior crossvein; arista closely plumose; pteropleural spot weak. Mid. States; Pa. (Hough); N. Y., N. J., Ont.* (*Dryomyza*)................................ **simplex** Loew

Sciomyza Fallen.

Sciomyza Fallen, not of authors, which becomes *Melina* Desv.
Bischofia Hendel, Abhandl. z. b. Ges. Wien, II, 52, (1902).

Largely shining black, the head, pleuræ, scutellum and abdomen laterally reddish to yellow; legs black, the middle pair yellow, except femora apically, the hind femora yellow toward base; arista sparsely plumose; veins bordered with brown, anterior crossvein beyond end of first vein; mesopleuræ bare. Queb., Ottawa. (*Bischofia varia* Coq., Can. Ent. XXXVI, 12, 1904)..**varia** Coquillett

Largely reddish species with reddish legs, the front pair with black tibiæ and tarsi, blackened femoral spot toward apex and paler knees; wings hyaline or apically infumated, anterior crossvein opposite end of first vein; mesopleuræ with posterior row of setulæ.......................... 2

2. Center of face polished and blackish; palpi apically blackish; plumosity of arista dense; 1 or 2 pteropleural bristles. Ottawa, Que., Me.,* N. H., N. Y., Mich. (*Dryomyza*).....................**aristalis** Coquillett

Face white pruinose and yellow; a pruinose stripe above notopleural suture, center of notum olivaceous, lower pleuræ pruinose; palpi yellow; plumosity of arista loose; usually 3 pteropleurals. Eur.; Mont.,* Wash.* (*Sciomyza simplex* Fall., Dipt. Suec. Sciomyz. 12, (1820); Meigen, Syst. Bes. VI, 10 (1830); Macquart, Suit. Buff. II. 405, (1835); Zetterstedt, Dipt. Sc. V. 2090, (1846); Schiner, Faun. Austr. II, 46 (1864); Rondani, Prodr. Dipt Ital. VII. Sciomyz. 39 (1868); Hendel. Abh. z. b. Ges. Wien, II. 53 (1902))......................**simplex** Fallen

Pteromicra Lioy.

Pteromicra Lioy, Atti. Instit. Veneto, IX, 1011 (1864).
Dichrochira Hendel, Abhandl. z. b. Ges. Wien, II, 57 (1902).

Two fronto-orbitals; wings only slightly longer than abdomen and narrow, the anal vein about one-third the length of the underside of the discal cell; front tarsi black. Subgenus *Pteromicra* Lioy. Eur.; Siberia; Alaska. (*Sciomyza*).....................................**glabricula** Fallen

One fronto-orbital; wings longer and usually broader, the anal vein about half the length of the underside of the discal cell. Subgenus *Dichrochira* Hendel.. 2

2. Arista thickly pubescent; head entirely black except on the pruinose facial orbits; palpi black.. 3

Arista loosely pubescent; head more or less reddish at least near frontal suture.. 4

3. Arista bushy, black, the antennæ reddish; front tarsi entirely black; hypopygium large; wings broad. Yellowstone Park.*... **melanothrix,** n. sp.

Arista white, the third antennal joint black; last 2 or 3 joints of front tarsi white; hypopygium small; wings narrow. Wash.,*..**leucothrix,** n. sp.

4. Palpi yellow; last 1 or 2 joints of front tarsi white........................ 5

Palpi and third antennal joint black; apical 3 joints of front tarsi white. Mass. (*Dichrochira albicalceata* Cresson, 39)...........**albicalceata** Cresson

5. Head largely yellow; front femora yellow only on basal portion; humeri, notopleural suture, scutellum and pleuræ brownish. H. B. T.; Wash.,* Mass., D. C. (*Sciomyza*)..................................**apicata** Loew

Head largely black; front femora two-thirds yellow; thorax altogether black. Eur.; Pa., Ill., Wisc.,* Wyom.,* Mont.,* Id.,* Wash.* (*Sciomyza nigrimana* Mg., Syst. Bes. VI, 14 (1830); Schiner, Faun. Austr. II, 45 (1864); Rondani, Prodr. Dipt. Ital. VII, Sciomyz, 42 (1868); Hendel, Abh. z. b. Ges. Wein, II, 58 (1902). *Dichrochira pleuralis* Cresson, 39)..**nigrimana** Meigen

Pteromicra melanothrix new species.

Male—Length, 4 mm. Head, including mouthparts, thorax, abdomen, front legs beyond basal three-fifths of femora, and apex of hind femora black, shining on body, dull on legs, antennæ, base of front legs, posterior legs, halteres and calypteres yellowish, two white pruinose occipital spots. Third joint of antennæ rounded-quadrate, the arista but slightly longer than the antenna, its basal joint thick and one-fourth the length of the arista. Lower pleuræ lightly white pruinose, a faint indication of three brown-dusted vittæ on mesonotum. Abdomen with short pubescence, hypopygium globose. Front femora bearing three small extensor bristles on apical half and hind femora bearing two. Wings a little grayish, veins blackish, the anterior veins brown, posterior crossvein slightly clouded, wings less than three times as long as wide, widest opposite anterior crossvein, first vein ending beyond anterior crossvein and at middle of wing, costal sections proportioned 1 : 1 : 2.5 : 0.9 : 0.6, of fourth vein, 1 : 1 : 1.7.

One specimen. Yellowstone Lake, Wyoming,* August 9, 1918.

Pteromicra leucothrix new species.

Length, 2–3 mm. Head, including mouthparts and third antennal joint, and front legs between the basal three-fifths of the femora and the apical two or three joints of the tarsi black, the body polished, base of antennæ, remainder of legs and halteres yellow, apical joints of front tarsi and arista white, occiput not pruinose. Third joint of antennæ elliptical, the arista twice as long as the antenna, its basal joint short. Lower pleuræ very lightly pruinose. Front femora with three and hind femora with two small bristles above toward apex. Wings nearly four times as long as wide, widest opposite posterior crossvein, nearly hyaline, veins blackish, second vein abnormally long, the costal sections proportioned 1 : 0.6 : 6 : 1 : 0.6, sections of fourth vein, 1 : 1 : 2.

Five specimens. Mount Constitution, Orcas Island, Washington,* July, 1919.

Melina Desvoidy. (*Sciomyza* of authors).†

Melina Desvoidy, Myodaires, 695 (1830).
    Arina Desvoidy, same, 696 (1830).
    Chetocera Desvoidy, same, 697 (1830).
Pherbellia Desvoidy, Myodaires, 696 (1830).
    Dyctia Desvoidy, same, 693 (1830).
    Ditænia Hendel, Abhandl. z. b. Ges. Wien, II, 66 (1902).
Graphomyzina Macquart, Hist. Nat. Ins., Dipt. II, 558 (1835).
Atrichomelina Cresson, Tr. Am. Ent. Soc. XLVI, 40 (1920).
    Achætomelina Cresson, same, 30 (1920).

---

† This dominant genus includes most of the species listed in Aldrich's Catalog under *Sciomyza*. Of the several generic names proposed by Desvoidy, *Dyctia* has page precedence, but because of its similarity to *Dictya* Meigen, of the same family, the name *Melina* adopted by Hendel and Cresson, is here used.

No median polished stripe on the front, the opaque frontal area not bisect 2

A stripe usually polished on the middle of the front continuing the ocellar triangle nearly or quite to the antennæ. Subgenus *Pherbellia* Desvoidy 17

2. Wings not pictured, at most the crossveins clouded.................... 3

Wings marked with spots or bars in addition to cloudings about the crossveins; femora and tibiæ of posterior legs centrally annulate. Subgenus *Graphomyzina* Macquart..................................15

3. Two or three fronto-orbitals; mesopleura bare or with posterior setulæ; propleural bristle evident. Subgenus *Melina* Desvoidy.............. 4

But one fronto-orbital; mesopleuræ uniformly pubescent; 0 coxal or abdominal bristles; propleural bristle reduced; ochraceous species with testaceous legs, the front metatarsi white; ♂ abdomen with fine close pubescence. Subgenus *Atrichomelina* Cresson. Mass.,* Ct., N. Y., Pa., D. C.,* Va., Fla.,* Ill.,* Wisc.,* La.,* S. D.,* Kans.,* Tex.,* Mont.,* Id.,* Wash.,* Or.,* Cal.* (*Sciomyza*).....**pubera** Loew

4. Bristles of head strong, 3 fronto-orbitals or the anterior midway between suture and posterior bristle; crossveins clouded; arista nearly bare; legs slender, front pair black, posterior pairs brown; largely gray species. Middle States; Me., Mass. (Hough), Md. (*Sciomyza*).....**tenuipes** Loew

Two fronto-orbital bristles... 5

5. Mesopleuræ with a row of setulæ along the posterior margin.......... 6

Mesopleuræ entirely bare of microscopic hairs.......................... 8

6. Occiput, thorax and abdomen, including hypopygium gray piceous, notum with 4 narrow brown vittæ, visible from in back, abdomen with paler incisures; front legs mostly black, posterior legs brown; wings nearly hyaline, the crossveins somewhat clouded; halteres yellow: 3–4 mm. Eur.;* Mont.,* Wyo.* (*Sciomyza griseola* Fall., Dipt. Suec. Sciomyz, 14 (1820); Meigen, Syst. Bes. VI, 13 (1830); Macq. Suit. Buff. II, 406 (1835); Zetterstedt, Dipt. Sc. V, 2100 (1846); Schiner, Faun. Austr. II, 47 (1864); Hendel, Abh. z. b. Ges. Wien, II, 34 (1902). *Sciomyza notata* Meigen, Syst. Bes. VI, 14 (1830); Zett. Dipt. Sc. V, 2103 (1846))...**griseola** Fallen

Head, body and legs almost entirely reddish or yellow, hypopygium yellow.. 7

Wings with yellowish costal border, the auxiliary, first and second veins yellow, remaining veins brown; body and legs reddish yellow, the front tibiæ and tarsi of ♀ dark; arista short-plumose. Eur.;* Me., N. H., Col., B. C. (*Sciomyza*)......................**albocostata** Falle

All the veins brown, wings uniformly subhyaline, the crossveins sometimes clouded; body and legs usually ochraceous brown; arista plumose; robust species with large hypopygium. Eur.;* Mass.,* Queb.,* N. Dak., Mont.,* Wyom.,* Idaho,* Wash.,* Cal.* (*Sciomyza fuscipes* Mcq., Suit. Buff. II, 407 (1835); Meigen, Syst. Bes. VII, 363 (1838); Rondani, Prodr. Dipt. Ital, VII, Sciomyz, 44 (1868). *Sc. dorsata* Zetterstedt, Dipt. Sc. V, 2096 (1846); Schiner, Faun. Austr. II, 46 (1864); Becker, Act. Soc. sc. Fenn. XXVI, 56 (1900); Hendel, Abh. z. b. Ges. Wien, II, 32 (1902). *Sc. notata* Schiner, Faun. Austr. II, 48 (1864). *Sc. ruficeps* Zetterstedt, Dipt. Sc. V. 2097 (1846); Rondani, Prodr. Dipt. Ital. VII, Sciomyz, 41 (1868). *Melina spadix* Cresson, 42. *Melina fusca* Cresson, 43)..**fuscipes** Macquar

Hind femora and tibiæ broadly paler along the center; eyes banded in life; mesopleuræ golden below, brown above; abdomen fasciate.......

Hind legs not evidently annulate; eyes uniformly colored............... 1

Face and occipital orbits with one, cheeks with two brown spots; arista rather long-plumose; scutellum sometimes yellowish; abdomen polished except on fasciæ; front legs of ♀ with femora and middle of tarsi blackish; anterior veins whitish toward base, outer part of wing largely infumated. N. H.,* N. Y., N. Car. (*Sciomyza albovaria* Coq. Proc. U. S. N. M. XXIII, 616 (1901))......................**albovaria** Coquille

Head not spotted; arista short-plumose to bare; scutellum blackish; abdomen not shining.. 1

10. Arista short-plumose; mesonotum vittate. Eur.;* N. Y.,* Queb.* (*Sciomyza annulipes* Zett. Dipt. Sc. V, 2113 (1846); Schiner, Faun. Austr. II, 49 (1864); Hendel, Abh. z. b. Ges. Wien, II, 26 (1902)). **annulipes** Zetterstedt

Arista bare or microscopically pubescent; mesonotal vittæ faint. (*vitalis* Cresson)..........11

11. Front tarsi entirely black. Mass., Id., Cal. (Cresson, 43). var. **vitalis** Cresson

Front tarsi pale at base. D. C., Wisc. (Cresson, 44)..var. **similis** Cresson

12. Abdomen uniformly reddish, contrasting with the mostly grayish thorax; front legs dark brown, posterior legs reddish; arista nearly bare. Eur.;* Id.,* Wash.,* Or. (*Sciomyza ventralis* Fall. Dipt. Suec. Sciomyz. 14 (1820); Zetterstedt, Dipt. Sc. V. 2112 (1846); Schiner, Faun. Austr. II, 50 (1864); Becker, Act. Soc. sc. Fenn. XXVI. 9, 58 (1900); Hendel, Abh. z. b. Ges. Wien, II, 44 (1902). *Helomyza fuscimana* Roser, Wuerttemb. Corrbl. 61 (1840). *Sciomyza rufiventris* Meigen, Syst. Bes. VI, 20 (1830); Macquart, Suit. Buff. II, 408 (1835). **ventralis** Fallen

Abdomen nearly concolorous with the thorax..........13

13. Arista loosely pubescent; incisures of abdomen paler. Eur.;* N. J., Mass., Ont., Wisc., Cal. (Hough); Queb., Ill.,* Nev., Wyom.* (*Sciomyza*). **obtusa** Fallen

Arista nearly bare..........14

14. Wings strongly infumated; blackish species measuring about 3 mm. with dark brown legs, the front pair blackish except the coxæ; halteres black. Pa., Ont. (Hough); Ind.* (*Sciomyza*)..........**luctifera** Loew

Wings nearly hyaline, the crossveins lightly infumated; larger species of gray-brown color with fasciate abdomen; front legs black, contrasting with their whitish coxæ and with the reddish posterior pairs; halteres yellow; antennæ black. Wyo.,* Mont.,* Id.,* Wash.,* B. C.* **palustris,** n. sp.

15. Ground-color of wings brown, filled with numerous small rounded hyaline spots; body grayish brown, marked with distinct sepia dots at base of each bristle and setula; eyes broader than deep, the head unusually wide; arista short-plumose. Tex.* (*Sciomyza*)......**guttata** Coquillett

Wings marked with a few short cross-bars; arista pubescent; eyes nearly round..........16

16. About 5 bars crossing submarginal cell, discal cell with a pair of spots; fourth vein emitting appendage into second posterior cell; a small brown dot at base of each thoracic setula; a velvet black mark between antenna and eye. Tex.,* Mex. (*Sciomyza strigata* Wulp, see Malloch, Can. Ent. 1914, 324). (*Sciomyza*)..........**trabeculata** Loew

Only a preapical crossband in the submarginal cell, markings of discal cell obsolete; no appendiculate vein; thorax with alternate brown and gray vittæ; at most a brown spot beside the antennæ. Eur.;* Mass.,* Ct.,* Ont.,* Queb., N. Y.,* N. J., N. H., Pa., D. C.,* Fla., Ill.,* Ind., Wisc., Ga. (Hough); La.,* Mo., Tex.,* S. D.,* Kans. (Aldrich), Col., Wyom.,* Mont.,* Id.,* B. C.,* Wash.,* Oreg.,* Cal., Mex. (*Sciomyza*). **nana** Fallen

17. Mesopleura entirely pubescent or posteriorly setulose; 1 fronto-orbital, 0 sternopleural, 2 pteropleurals, prescutellars strong; oral angle of face acute or perpendicular in profile; arista bare, or nearly so..........18

Mesopleura bare; 2 fronto-orbitals, prescutellars vestigial; oral margin not prominent; arista pubescent to plumose; species under 5 mm..........19

18. Mesopleura entirely pubescent; thickened basal portion of arista one-third arista-length; abdomen fasciate only; third antennal joint brown; grayish red species; 4 to 5 mm. Eur.; Pa., Fla., Ill.,* Wisc. (Hough). Ga.,* Tex.,* S. D. (Aldrich), Mont.,* Wash.,* Cal.* (*Sciomyza grisescens* Meigen, Syst. Bes. VI, 20 (1830); Macquart. Suit. Buff.

II, 408 (1835); Becker, Zts. Hym. Dipt. II, 253 (1902); Hendel, Abh. z. b. Ges. Wien, II, 66 (1902). *Sc. brevipes* Loew, N. Beitr. IV. 54 (1856). *Sc. humilis* Loew; Hendel, Wien ent. Ztg. XX. 199 (1901). *Sc. nasuta* Zetterstedt, Dipt. Sc. V. 2114 (1846))......**grisescens** Meigen

Mesopleura with a row of setulæ along posterior margin; basal portion of the microscopically pubescent arista one-fourth the arista-length; abdomen with three interrupted brown vittæ; antennæ reddish; robust rust-red species; 6 to 7 mm. Neb., Tex.* (Cresson, 50)..**trivittata** Cresson

19. Wing cells with single rows of variable brown spots; about 4 pteropleural bristles. Eur.;* Queb., N. Y., Ill., Col. (Hough), Wyom.,* Mont.,* Id.,* Wash.* (*Sciomyza Schoenherri* Fall., Dipt. Suec. Sciom. Suppl. 2a, 13 (1826); Zetterstedt, Dipt. Sc. V. 2107 (1846); Schiner, Faun. Austr. II, 50, (1864); Rondani, Prodr, Dipt. Ital. VII, Sciom. 45 (1868); Becker, Act. Soc. sc. Fenn. XXVI, 58 (1900); Hendel, Abh. z. b. Ges. Wien, II, 70 (1902). *Sc. monilis* Meigen, Syst. Bes. VI, 17 (1830). *Pherbellia vernalis* Desvoidy, Myodaires, 696 (1830). *Graphomyzina maculata* Cresson, 48)..............................**schoenherri** Fallen

Wings nearly hyaline, not maculate; oral margin in profile forming an obtuse angle with face. Eur.; Wyom.,* Id.* (*Sciomyza brunnipes* Meigen, Syst. Bes. VII, 364 (1838); Schiner, Faun. Austr. II, 50 (1864); Hendel, Abh. z. b. Ges. Wien, II, 71 (1902); Becker, Zts. Hym. Dipt. II, 253 (1902). *Sc. coxata* Zetterstedt, Ins. Lapp. 739 (1838). *Sc. pusilla* Zetterstedt, Ins. Lapp. 739 (1838), Dipt. Sc. V, 2115 (1846)).
brunnipes Meigen

Melina palustris new species.

Length, 4–5 mm. Dark colored species with black front legs, vittate thorax and fasciate abdomen. Front luteous, parafrontal stripes and median triangle gray, reaching half way down the front; face and cheeks pale yellowish, a brown or black orbital spot next the antennæ, occiput black, gray dusted, the cervical spot indistinct; antennæ quite blackish, the arista black, appearing bare under ordinary magnification, two and a half times the length of the third joint; palpi yellowish. Thorax black in ground color, thickly dusted, gray above and faintly vittate, apex of scutellum reddish, a strong brown-dusted subalar stripe and a weaker stripe along the sternopleural suture, metapleural callosity velvety dark brown, pectus whitish pruinose, balance of pleuræ silvery gray; mesopleura entirely bare, pteropleura with a few hairs and two or three bristles anteriorly, sternopleura with fine bristles above. Abdomen blackish, the apices of the sclerites yellow, hypopygium blackish with more or less reddish tinge. Front coxæ white, contrasting with remainder of legs, front femora stout and setose, knees narrowly brownish; posterior legs brown, hind femora with about four setæ above. Halteres and calypteres pale yellow. Wings hyaline, anterior veins brownish, posterior veins blackish, crossveins scarcely at all infumated, sections of fourth vein proportioned 1 : 0.7 : 1, anal vein slightly more than half the underside of the discal cell.

Over one hundred specimens. Type from Lake Chatcolet, Idaho,* August, 1915. Paratypes, all collected by the author, from Yellowstone Park, Wyoming,* Three-Forks, Montana;* Priest Lake, Moscow and Lake Waha, Idaho;* Pullman and Dungeness, Washington,* and Nelson, British Columbia.*

Hemitelopteryx Cresson.

Hemitelopteryx Cresson, Trans. Am. Ent. Soc. XLVI, 51 (1920).
Heteropteryx Hendel (not Gray, 1835), Abh. z. b. Ges. Wien, II. 81 (1902); Cresson, 30 (table), 87 (list).

Head and mouth-parts black, antennæ yellow, front velvety, except the shining median stripe; thorax yellowish, with 2 broad stripes and anterior margin black; abdomen black except basal angles; legs mostly yellow, front coxæ silvery white, front tibiæ and tarsi black, except apical joints; wings blackish; 3.5 mm. N. H., Mass. (Cresson, 51). **johnsoni** Cresson

Antichæta Haliday.

Antichæta Haliday, Ann. Nat. Hist. II, 187 (1839); Hendel, Abh. z. b. Ges. Wien, II, 78 (1902).

Reddish yellow species, at most the front legs piceous; 2 fronto-orbitals.... 2
Head; thorax and abdomen black; 1 fronto-orbital; antennæ yellow, palpi black, arista heavily pubescent; sides of front velvety black; upper pleuræ shining; front coxæ white-pruinose; first vein ending beyond anterior crossvein. Wisc.*............................ **melanosoma**, n. sp.

2. Palpi and third antennal joint black, thorax shining, the notum centrally pollinose except for 2 brown vittæ, upper pleuræ shining; more or less of front femora and tibiæ and all tarsi brown, front coxæ white; abdomen brown, ♂ genitalia reddish. Eur., Mass. (Loew coll.) (*Sciomyza analis* Meigen, Syst. Bes. VI, 15 (1830); Zetterstedt, Dipt. Sc. V. 2104 (1846). *Antichæta analis* Hendel, Abh. z. b. Ges. Wien, II. 79 (1902). *Tetanocera vittata* Haliday, Ent. Mag. I. 168 (1833). *Sciomyza vittata* Rondani, Prodr, Dipt. Ital. VII, Sciom. 43 (1868).........**analis**, Meigen
Palpi and antennæ yellowish; pleuræ more or less pollinose above........ 3

3. Dark ferruginous, thorax heavily pollinose, trivittate with black; front coxæ and posterior legs yellowish, remainder of front legs piceous; eyes deeper than long; 6 mm. Mont.*................**robiginosa**, n. sp.
Testaceous, notum not vittate; legs yellowish; eyes longer than deep; 5 mm. Mont.*..**testacea** n. sp.

Antichæta robiginosa new species.

Female—Length, 6 mm. Ferruginous; head testaceous, face and cheeks yellow and overlaid with white pruinosity, a bigeminal silvery white cervical spot on cinereous ground; middle frontal stripe shining, with parallel sides, about one-fifth the width of the front and attaining the suture; front slightly wider than long, a little narrowed anteriorly, the triangular lunule nearly hidden, two fronto-orbitals; eyes large, rounded, face receding at an angle of ninety degrees to the front, cheeks about one-third the diameter of the eye; antennæ ferruginous, second joint short, obconic, third joint ovoid, one-half longer than deep, with a slight infuscation above, arista black, finely plumose, but one-half longer than the third joint of the antennæ; palpi long, testaceous, black-setose. Mesonotum centrally blackish overlaid with gray pollen, trisected by two narrow opaque stripes of golden brown pollen, a stripe of whitish yellow pollen above notopleural suture; upper pleuræ rusty, lower white-pruinose, the ground color of the sternopleuræ largely black; thoracic bristles strong, one humeral, two notopleural, one presutural, one supra-alar, two intra-alar, two dorsocentral, no prescutellar, four scutellar, no pleural. Abdomen brown, black-setulose, fifth tergite broadly emarginate and apically fringed with three bristles on each side. Front coxæ testaceous, but silvery pollinose, remainder of front legs piceous, the tarsi black, posterior legs including tarsi testaceous, front femora with five extensor bristles, front tibiæ with one preapical, two or three anterior bristles on middle femora, four extensor and a few short irregular bristles on hind femora, the two preapical bristles of hind tibiæ large. Halteres and calypteres brownish yellow. Wings uniformly infumated, a little stronger along the costa and besides the posterior crossvein; veins dark brown, first vein ending a little before the anterior crossvein, posterior crossvein straight, costal sections proportioned 1 : 1 : 3 : 1.2 : 0.7.

One specimen. Three Forks, Montana,* August 1, 1918.

Antichæta testacea new species.

Male—Length 5.2 mm. Occiput yellow, cervical spot brown, front luteous, periorbits subshining, extending half way to suture, middle stripe with parallel sides, complete, face, cheeks and lower occiput pale, profile very slightly concave and receding, cheeks one-third the eye-height, eyes horizontally oval, two fronto-orbitals; antennæ reddish, first joint minute, second bowl-shaped, shorter than deep and one-third as long as the oval third joint, arista black except its basal joint, its hairs moderately long and loose. Thorax entirely testaceous, not heavily dusted; genitalia large, yellow. Legs yellow, last tarsal joint darkened, front femora with about six bristles above and hind femora with about three above and eight below; middle femora with two small bristles in front near center. Halteres yellow. Wings hyaline, veins thin, yellowish, apically and crossveins darkened, posterior crossvein straight and perpendicular to fifth vein.

Holotype. Collected by A. D. Hastings, June 11, 1904, in Gallatin County, Montana.*

Antichæta melanosoma new species.

Female—Length, 4.5 mm. Body black, legs mostly yellow. Front wider than long, quadrate, middle stripe shining, parallel-sided, attaining suture, as broad as each of the opaque side stripes, periorbits shining, only one fronto-orbital; lower orbits pruinose and yellowish, center of face triangularly black, cheeks about one-fifth eye-height, lower occiput brown, upper shining black, with bigeminal silvery spot; mouthparts black; antennæ yellow, second joint shorter than deep, third joint oblong-oval, one-third longer than deep and half as long as arista, the base of the bushy black arista stout. Notum subshining, lower pleuræ pruinose, chætotaxy as in *A. robiginosa*, upper surface of abdomen shining. Legs, including coxæ, yellow; front coxæ with silvery sheen, the front legs black beyond three-fifths of the femur, two preapical bristles on hind tibia. Halteres, calypteres and root of wing yellow, wings hyaline, veins brown, not infumated, costal sections proportioned 0.8 : 1 : 1.2 : 0.8 : 0.5, anterior crossvein at middle of discal cell.

One specimen. Polk County, Wisconsin, July, collected by Professor C. F. Baker and transmitted by Dr. Aldrich.

Renocera Hendel.

Renocera Hendel, Verh. z. b. Ges. Wien, L. 333 (1900); Abh. z. b. Ges. Wien, II, 74 (1902). Cresson, 51.

Two fronto-orbitals; mesonotum opaque, vittæ distinct; cheeks nearly equal to eye; no humeral, prescutellar or presutural bristles, 1 dorsocentral; front tarsi black.......... 2

One fronto-orbital; mesonotum subopaque, vittæ faint; cheeks narrower; base of tarsi light colored.......... 3

2. Third antennal joint quadrate, scarcely one-half longer than deep; uniformly ochraceous; posterior crossvein inflexed. Mont.* **quadrilineata,** n. sp.

Third antennal joint broadly rounded, nearly twice as long as deep; abdomen with brown median vitta; posterior crossvein nearly perpendicular to fourth vein. Me., B. C.......... **johnsoni** Cresson

3. Arista very densely plumose to tip; third antennal joint tapering to the rounded apex, slightly concave above. N. H., N. Y., Pa. (*Sciomyza*). **longipes** Loew

Arista loosely plumose or pubescent; third antennal joint rounded oblong... 4

4. Arista very short pubescent; cheeks one-third the eye-height; periorbital shining stripe undeveloped; femoral and abdominal bristles present. N. Y. (*Chætomacera brevis* Cresson, 58).......... **brevis** Cresson

Arista short plumose; periorbital stripes shining; abdominal bristles weak.......... 5

5. Apical 2 tarsal joints black; notum not vittate, sparsely pruinose medially; cheeks one-fourth the eye-height; anterior margin of front shining; femoral bristles weak. Me., N. H. (Cresson, 54)....... **amanda** Cresson

Last tarsal joint black; notum quadrivittate, scarcely shining; cheeks one-half the eye-height; anterior margin of front dull; femoral bristles present. Wash.*.......... **cyathiformis,** n. sp.

Renocera cyathiformis new species.

Male—Length, 6 mm. Ochraceous, frontal stripes, face, cheeks, antennæ, palpi, halteres and legs yellow. Interfrontal stripe narrow and attenuated anteriorly, reaching the luteous opaque frontal margin, orbital stripes golden pollinose, reaching half way down the front, sides of front gently arching so as to constrict the front at the antennæ to two-thirds its width at the ocelli, anterior fronto-orbital vestigial; second joint of antennæ very short, bowl-shaped, much deeper than long, with numerous fine setulæ, third joint oblong oval, one-half longer than deep, the arista black, with short and rather sparse hairs; cheeks half the width of the circular eyes; palpi yellow. Thorax as in *Tetanocera*, quadrivittate, dusted, scarcely shining, one humeral, two notopleural, one presutural, one supra-alar, one intra-alar, two dorsocentral, one prescutellar, four scutellar, no propleural or other pleural bristles, sternopleuræ alone sparsely hairy. Abdomen without strong bristles, base of end-paramera of hypopygium thin and circular, terminal portion short. Middle femora with one anterior bristle; hind femora with two bristles above and about four below in the anterior row, in addition to the many flexor setæ, which are less pronounced than in species of *Tetanocera:* last tarsal joint black. Wings with strong and uniform yellow tinge, anterior veins yellow, posterior veins brown, costal region not clouded, crossveins lightly infumated, posterior crossvein straight and transverse, sections of costa proportioned 1 : 1 : 1.5 : 1 : 0.6, of fourth vein, 1.3 : 1 : 1.4, third vein gently curved, ending at wing-tip, parallel with fourth vein, anal vein reaching margin, as long as last section of fourth vein.

One specimen. Mount Constitution, Orcas Island, Washington,* August 7, 1909.

Renocera quadrilineata new species.

Female.—Length, 5 mm. Light ochraceous; front one-third broader than long, scarcely tapering anteriorly, the impressed shining middle stripe occupying one-sixth of the front, parallel-sided and attaining the suture, sides of front anteriorly yellow, two rather small fronto-orbitals; face and cheeks almost white and satiny, the cheeks nearly as wide as the circular eye; antennæ short, reddish yellow, the topmost setula of the small second joint strong, third joint quadrate-oval, one-half longer than deep, the black arista nearly twice the length of the third joint, with short sparse fine plumosity; palpi yellow, with very fine sparse black hairs. Thorax prettily marked with four chocolate brown stripes, the middle pair complete and expanding before the scutellum, the outer pair shortened in front and interrupted just behind the cross-suture, notal setulæ rather sparse, black and unusually distinct, chætotaxy reduced to two notopleural, one supra-alar, two intra-alar, one dorsocentral and four scutellar bristles; a light brown stripe along upper pleuræ, lower pleuræ pale ochraceous, sternopleuræ with a few fine setulæ. Legs yellowish, front tarsi black, about five small bristles above and eight short setæ below on front femora, middle femora with one anterior bristle, hind femora without bristles, but with a double row of stout spines beneath along the apical half, each row containing about ten; tibial bristles small. Halteres and calypteres yellow. Wings with strong yellowish tinge, blackened along the crossveins, veins basally yellowish, apically black, costal sections proportioned 1.2 : 1 : 2 : 1 : 0.6, three sections of fourth vein subequal, posterior crossvein straight, third vein gently curved, ending at wing-tip, anal vein strong.

One specimen. Three Forks, Montana,* August 1, 1918.

Poecilographa Melander.

Pœcilographa Melander, Psyche, XX, 205 (1913.)
Pœcilomyia Melander (not Hendel, Richardiinæ), Psyche, XX, 58 (1913).

Yellow, the broad convex shining interfrontalia blackish except medially, bristles of head and thorax arising from conspicuous brown spots, six pleural brown spots, three rows of light brown spots on abdomen, femora with a brown mark below toward tip; wings with a well defined brown pattern, radiating along costa and apex and forming hyaline round spots elsewhere. 4 mm. Me., N. Y., Can., N. J., Pa., Ill., Wisc.,* Col. (*Sapromyza*)..**decora** Loew

Dictyomyia Cresson.

Dictyomyia Cresson, Trans. Am. Ent. Soc. XLVI, 82 (1920).

Brown, lower frontal orbits velvety black, a similar orbital spot below antennæ, both sets irregularly margined with white pruinosity, notum and abdomen with numerous darker dots; legs mostly testaceous; wings with blackish costal margin, roughly with two rows of spots in marginal cell, four in submarginal, three in first posterior, other cells more irregular; 6 mm. Me., Queb.,* Wyom. (Hough). (*Tetanocera*)......**ambigua** Loew

Euthycera Latreille.

Euthycera Latreille Cuvier, Regn. Anim. V, 529 (1829).
Lunigera Hendel, Verh. z. b. Ges. Wien. L. 344 (1900).

Yellowish, face silky white, lunule and 2 orbital spots black, notum with small brown setigerous spots, scutellum blackish, with velvet black margin and apical white dot; third antennal joint rounded triangular, slightly shorter than the quadrate swollen second joint; wing markings variable, the diluted spots in marginal cell irregular and numerous; 5 to 8 mm. N. H., N. Y., Queb.,* Ont., Pa.,* N. J., Md., Va., Car., Mid. States, Ind.,* Ill., Wisc.,* Tenn., Nebr. (*Tetanocera flavescens* Loew, 1847, not Desvoidy, 1830, not even a valid variety. *E. uniformis* Cresson, 74. *Tetanocera*)..**arcuata** Loew

Similar; second antennal joint shorter than third; the diluted spots of marginal cell quadrate and regular, those of submarginal and first posterior cells rounded. Me., N. H., N. Car. (Cresson, 74)..........**borealis** Cresson

Trypetoptera Hendel.

Trypetoptera Hendel, Verh. z. b. Ges. Wien. L. 352 (1900).

Reddish yellow, face pale yellow, greatly receding, a brown spot beside antennæ, legs yellow, notum not spotted; second antennal joint short, nearly square, third joint short, bluntly triangular; costal border blackish, reticulations rather close and guttated, about six clear dots before second vein which scarcely reach the costa; anterior crossvein before middle of discal cell; 7 mm. Queb., Vt., N. Y., N. J.,* Pa.,* Md., Va., Mid. States, Ill.,* Ind.,* Col., Ut., N. Mex., Wyom.* (*Tetanocera pallida* Loew). (*Tetanocera*)..................................**canadensis** Macquart

Hoplodictya Cresson.

Hoplodictya Cresson, Trans. Am. Ent. Soc. XLVI. 67 (1920).

Legs more or less marked with brown; third antennal joint scimiter-shaped; wing-pattern dark brown, posterior crossvein gently arched; metapleural callosity black; posterior processes of hypopygium small and more or less triangular.. 2

Legs yellow except the dark tips of the tarsi; third antennal joint with rounded tip; wing-pattern flavous, the pale spots weakly defined, posterior crossvein gently sinuous; metapleural callosity brown; posterior processes of hypopygium long, paramera large, compressed, reniform; 7 mm. Mass.,* N. Y.,* Ga. (*Tetanocera*)......**setosa** Coquillett

2. In general 4 square spots in marginal cell in addition to other smaller spots, anterior crossvein before middle of discal cell; all femora with 3 incomplete dark rings; third antennal joint pointed; 4-5 mm. Cuba, Md., Fla., La.,* Tex.,* Nev., Cal. (*Tetanocera*)......**spinicornis** Loew

In general 5 square spots in marginal cell beyond end of first vein, anterior crossvein at middle of discal cell; posterior femora with a single dark spot underneath just beyond middle, front femora entirely yellow; third antennal joint bluntly pointed; 5-6 mm. Bermuda.* (*Tetanocera kincaidi* Johns., Ann. Ent. Soc. Am. VI, 449, 1913)......**kincaidi** Johnson

Dictya Meigen.

Dictya Meigen, Illig. Mag. II, 277 (1803), not Fabricius, Syst. Antl. 325 (1805), and not *Dyctia* Desvoidy.
Monochætophora Hendel, Verh. z. b. Ges. Wien. L. 335 (1900); Cresson, 68.

Meigen founded his genus *Dictya* on specimens of *umbrarum* Linn., but unfortunately credited the species to Fabricius instead of Linnæus. As *umbrarum* Fabr. is a different insect, belonging to the ortalid genus *Platystoma*, Cresson would make *Dictya* a synonym of *Platystoma*, and revive for the species *umbrarum* Linnæus Hendel's genus *Monochætophora*, abandoned in the Catalog of Palæarctic Diptera. Such a course carries the technical letter of nomenclatorial law unnecessarily far, for it is as difficult to conceive how the sciomyzid genus *Dictya* can be converted into an ortalid as for the proverbial leopard to change its spots.

Brownish, body and even femora with abundant dark setigerous spots, face yellowish, with central black dot, tip of front tibiæ and all femora with blackish marks; wings dark, with numerous small rounded hyaline spots; arista loosely plumose with black; front without shining stripes; 6 mm. Eur., Mass.,* N. H., Ct.,* Queb., N. Y.,* Pa., N. J., Md., D. C.,* Va., N. Car., Fla., Ga., Ia., Ind.,* Ill.,* Wisc., Ga., La., Tex.,* Kans.,* Dak., Neb., Man., Nev., Ariz., Col., Id.,* Wash.,* Or.,* Cal.,* Mex. (*Tetanocera pictipes* Loew). (*Tetanocera*)..........................**umbrarum** Linnæus

Elgiva Meigen.

Elgiva Meigen, Syst. Bes. VII, 366 (1838).
Chione Desvoidy (not Megerle, 1811, Mollusca), Myodaires, 679 (1830).
Ilione Haliday, Westwood's Introd. Classif. Ins. 146 (1840).

Reddish yellow, notum lightly cinereous, with two approximate median and one lateral vittæ; face and arista white; wings whitish, costa brownish, submarginal cell hyaline, the crossveins and a longitudinal stripe behind the third vein gray, fourth vein with one or two weak spots between the crossveins. Eur.,* Me. (Boston Soc. Nat. Hist., Johnson, in litt.) (*Tetanocera lineata* Fall., not Day, Dipt. Suec. Sciom. 11 (1820); Meigen. Syst. Bes. VI. 43 (1830), VII. 366 (1838); Loew, Dipt. Beitr. I. 46 (1845); Zetterstedt, Dipt. Sc. V. 2114 (1846); Walker, Ins. Brit. II, 167 (1853). *Ilione lineata* Haliday, Westw. Introd. Classif. Ins. 146 (1840). *Elgiva lineata* Schiner, Faun. Austr. II, 63 (1864))..................**lineata** Fallen

Hedroneura Hendel.

Hedroneura Hendel, Wien. ent. Ztg. XXI, 265 (1902).

Ferruginous, face and cheeks pale yellow, silky, front wider than long, two orbital spots; antennæ reddish, second joint longer than third, the last bluntly triangular, arista white with yellow base; hind femora irregularly spinose beneath; wings yellowish in front, lightly brownish behind, with blackish spots below end of second vein, on anterior crossvein and at front end of posterior crossvein, irregular clouds also in apical cells; 7 mm. Eur.; Ct., Ont., N. Y., Ill., Wisc., Col., Wyo.,* Mont.,* Id.,* Nev., Wash.,* Or., B. C., (Cole). *Musca rufa* Panzer, F. Germ. 54 (1798). *Tetanocera rufa* Loew, Dipt. Beitr. 1, 42 (1845); Zetterstedt, Dipt. Sc. V. 2141 (1846); Schiner, Faun. Austr. II, 63 (1864); Rondani, Prodr. Dipt. Ital. VII, Sciom. 15 (1868). *T. cucularia* Fabricius, Sp. Ins. II, 449 (1781). *T. lineata* Day, not Fallen. *T. Sundewalli* Fries, Monogr. Tanypez. Suec. 17 (1823)..**rufa** Panzer

Limnia Desvoidy.

Limnia Desvoidy, Myod. 684 (1830).

Oregocera Rondani, Prodr. Dipt. Ital. I. 106 (1856), VII, Sciom. 23 (1868).

The brown costal margin distinctly interrupted by clear spots; eyes round; arista loosely plumose, third antennal joint but slightly excised above. (*Boscii* Desvoidy).. 2

The uninterrupted brown costal border attaining apex of the wings; eyes horizontally oval; arista closely plumose to tip, third antennal joint distinctly excised above.. 3

2. Brown spots of wings paired so as to form transverse double bands, interspaces yellow. Me., Mass.,* Ct., Ont., Queb., N. Y., Pa., N. J., Md., Va., N. Car., Mid. States, Ill.,* Wisc.,* Col., Mont. (*T. combinata* Loew). (*Telanocera*)......................**Boscii** Desvoidy, s. str.

Wing reticulation uniform, not forming cross-bands, interspaces hyaline. Me., N. H., Queb., Ont.,* N. Y., N. J., Mid. States, Mont.,* Wash.* (*T. inopa* Adams). (*Telanocera*)................**Boscii** var. **sparsa** Loew

3. Robust species, 7 to 8 mm. in length: second antennal joint much longer than third and strongly bristly above. Id.,* Wash.,* Or.,* Cal. (*Telanocera*)..**pubescens** Day

Length 4 to 7 mm.; second antennal joint not much longer than third and not remarkably setose above, usually only bisetose.................... 4

4. Second antennal joint with distinct dark spot, third joint short and blunt; frontal bristles weak; costal margin dark, with small round spots in marginal and submarginal cells; scutellum yellow. Md. (Cresson, 78)..**shannoni** Cresson

Antennæ not maculate, third joint more acute; frontal bristles strong; scutellum often darker.. 5

5. Posterior crossvein nearly straight and perpendicular; prescutellar bristles vestigial or wanting. (*costalis* Loew)........................ 6

Posterior crossvein distinctly sinuous; prescutellar bristles more or less developed.. 8

6. Scutellum uniformly yellow, contrasting with the mesonotum, notal vittæ faint; submarginal cell with elongate dark spots along the second vein, the median streaks almost obliterated. N. H., N. Y., Md., Ill. var. **costalis** Loew, s. str.

Scutellum not contrasting with mesonotum; dark spots of submarginal cell usually short, median streaks usually evident...................... 7

7. Brown of costal margin continuing unbroken to or beyond fourth vein; mesonotal vittæ strong, distinct brown vittæ present between the narrow median yellowish stripe and the lateral gray vittæ; hypopygial paramera square and bare, with prong at middle of apical edge. Mont.,* Id.,* Wash.*................................**costalis** var. **vittata,** n. var.

Brown of costal margin stopping at third vein; mesonotal vittæ faint. Avon, Id.,* 26 July, 1912..........**costalis,** var. **brevicostalis,** n. var.

8. Notal setulæ abundant, about 4 irregular rows on the central vitta; cheeks less than half the eye-height; pubescence of arista longer and more open; front wider than long.. 9

Notal setulæ sparse, about 2 rows on the central stripe; cheeks more than half the eye-height; pubescence of arista short and close, almost appressed; sides of interfrontal stripe parallel; some pale spots touching second vein, about 14 pale spots in first posterior cell; dark spot at posterior fronto-orbital weak; lower pleuræ with yellow tinge. (*saratogensis* Fitch)..11

9. Wings almost uniformly brown, the costal border and faint spottings near the veins darker; vallar and pleural setulæ weak; flexor spines of hind femora ♂ moderately strong; tibiæ and base of tarsi ♂ light brown; both fronto-orbitals arising from black spots. Ga.* .**georgiæ,** n. sp.

Wings with definite hyaline markings, about 18 clear spots in first posterior cell; vallar and pleural setulæ relatively strong; flexor spines of hind femora ♂ well developed; apex of front tibiæ brown ♂, or black ♀; front tarsi proximally brown ♂ or entirely black ♀. (*louisianæ*, n. sp)..10

10. Arista heavily plumose; interfrontal stripe ♀ widest between the anterior fronto-orbitals. La.*..................................**louisianæ,** s. str.

Arista short-plumose; interfrontal stripe relatively narrow and nearly parallel-sided. D. C.,* Ind.*....**louisianæ,** var. **septentrionalis,** n. var.

11. Underside of hind femora ♂ strongly spinose; front wider than long; wing-spots nearly hyaline. Clga. Wash.*..**saratogensis,** var. **armipes,** n. var.

Underside of hind femora ♂ moderately or weakly spinose; front square or slightly longer than wide..12

12. Infuscation of wing evanescent basally; only tip of front tibiæ and more or less of front tarsi dark..13

Wing-pattern intense, infuscation not evanescent basally; apical half of front tibiæ and all of front tarsi black. Cal. (Cresson, 80). **saratogensis,** var. **severa** Cresson

13. A dense double patch of black setulæ on third sternite, paramera pentagonal and nearly bare; second antennal joint not longer than deep. Ottawa*............................**saratogensis,** var. **ottawensis,** n. var.

No patch of setulæ on third sternite; second antennal joint somewhat longer than deep. Me., Mass.,* N. H., Vt.,* Ct., N. Y.,* Ont.,* Queb.,* N. J., Pa., Md., D. C.,* Va., N. Car., Wisc., Ill.,* Ind.,* Mo., Minn., Dak., Mont.,* Sask., Wyom., Wash.,* B. C.,* Cal. (*Tetanocera*)..**saratogensis** Fitch, s. str.

Limnia georgiæ new species.

Male—Length, 5 mm. Front and occiput fulvous, face and cheeks sericeous pale yellow, three fronto-orbital black marks well developed, a cervical brown spot, anterior orbits silvery; front nearly quadrate, slightly wider than long, the middle stripe occupying a little more than one-fifth of the front, somewhat widening anteriorly; antennæ yellow, second joint quadrate, longer than the third, with two setæ above, third joint emarginate dorsally, with rounded tip, arista defective. Thorax ferruginous, two dorsal vittæ, sides of notum and lower pleuræ cinereous, metapleural callosity brown; notal setulæ strong and close, pleural setulæ weak. Abdomen piceous brown, fourth sternite with distinct patches of black spicules. Legs yellowish, tarsi apically dark, flexor spines of hind femora moderate. Knob of halteres infuscated. Wings entirely brown, becoming flavescent around the anterior crossvein, no hyaline reticulations or brown bars, costal portion darker, a few vague, slightly darker spots near the veins, sections of fourth vein equal, posterior crossvein sinuous.

Holotype: Tifton, Georgia,* June 13, 1896, received from Dr. Hough, whose manuscript name has been retained for the species.

Limnia louisianæ new species.

Male—Length, 6 mm. Head fulvous, cheeks and face sericeous white, a square cervical and three round orbital spots black; front wider than long, middle stripe occupying nearly one-fourth of the front, widest anteriorly; second joint of antennæ oblong, with two dorsal converging bristles, third joint triangular, shorter than the second, reddish at base and distally brownish, arista as long as the antennæ, loosely and long plumose. Notum ferruginous, bivittate with gray, setulæ close and evident, but lacking on the grayish lateral stripes; upper pleuræ fulvous, lower testaceous and pollinose, metapleural callus brown, pleural setulæ unusually strong, especially the vallar pair. Abdomen grayish brown. Legs yellowish, apex of tibiæ brownish, tarsi distally dark, flexor setæ of hind femora strong. Halteres tipped with brown. Wings strongly infumated along costal portion so that no hyaline areas touch the second vein, remainder of wing with numerous quadrate hyaline areas which frequently coalesce, posterior crossvein straight in front and sinuous behind; middle section of fourth vein slightly longer than the others.

Female—7 mm. Front and its middle stripe slightly broader; apex of front tibiæ and all of front tarsi black, hind femora tipped with brown.

Opelousas, Louisiana,* March, 1897, received from Dr. Hough, whose manuscript name has been retained.

Var. *septentrionalis*, n. var. Feathering of arista shorter; interfrontal stripe nearly parallel-sided; pleural setulæ less pronounced; reticulation of wings more definite and wider spread, the paler portions with yellowish tinge, a row of square marks touching the second vein.

Male and female, Washington, D. C.,* 17 August, 1913. A male, Lafayette, Indiana,* 4 July, 1914, has narrow interfrontal stripe and lacks the black spot at the base of the posterior fronto-orbital bristle.

Limnia saratogensis Fitch.

This species is widely distributed and is either variable or is a composite of several forms. The coordinate European species *L. unguicornis* Scopoli differs as set forth below:

L. unguicornis: Elevated patches of black setulæ present on fourth and fifth sternites; paramera bluntly triangular with tumid apex; notal setulæ abundant, about four rows on middle vitta; reticulation of wings usually evanescent behind fourth vein and weak along second vein; cervical spot large and black.

L. saratogensis: Patches of setulæ scarcely or not elevated on fourth sternite and absent on fifth; paramera irregular; notal setulæ not abundant, about two rows on middle vitta; wing-pattern more or less developed in discal and third posterior cells, not weakening along second vein; cervical spot less intense.

Tetanocera Dumeril.

Chætomacera Cresson, Trans. Am. Ent. Soc., XLVI, 54 (1920).

Cresson would discard the long established and well understood *Tetanocera*, even though he has not seen the original paper of 1798, mentioned by Osten Sacken, basing his argument upon a later and apparently different edition. As little is to be gained by the overthrow of important names until every doubt has been removed, the genus name *Tetanocera* will be here retained in its accepted usage.

Wing cells with brown cross-markings in addition to clouding of the crossveins; frontal orbits polished, interfrontal stripe reaching frontal suture; hind femora with 2, rarely 3, extensor bristles.................. 2

Wings not lattice-marked, the crossveins clouded; frontal orbits usually subshining, interfrontal stripe stopping usually before the suture; hind femora with 3 or more stouter extensor bristles.................. 3

2. Interfrontal stripe slightly wider anteriorly, parafrontal stripes extending but little in front of forward bristle; spots before second vein indistinct, 5 spots in submarginal, 3 in first posterior cell, anterior part of discal cell with 1 or 2 spots, hind crossvein oblique. N. H., Mass., N. Y., Ct., N. J.,* Pa., Md., Va.............................**clara** Loew

Interfrontal stripe with parallel sides, frontal stripes extending much beyond anterior fronto-orbital; about 8 distinct spots in marginal cell, 4 in first posterior, both sides of fifth vein with spots, posterior crossvein more nearly perpendicular. Me., N. H., Vt., Mass., R. I., Pa. (Hough), Queb., Cnt.,* N. Y., Ill., Col.,* Wyo.*........**valida** Loew

3. Anterior margin of front shining and connected with 3 polished stripes; paramera biexplanate at tip; hind femora apically narrowly brown; wings slightly infumated, crossveins browned, posterior crossvein nearly straight; arista with long loose plumosity. Eur.,* Man. (Meigen, Syst. Bes. VI, 41, 1830; Cresson, 65).........**silvatica** Meigen

Anterior margin of front dull; paramera more or less pointed, rounded, or truncate.. 4

4. Frontal orbits almost as wide as median stripe and polished, the median stripe continuing almost to the suture; hind femora of ♂ with 3 or 4 bristles in front and with the flexor spines not dense, of ♀ with 2 such bristles; thoracic vittæ scarcely darker; third antennal joint triangular. plumosity of arista moderately close; ocelli equidistant; posterior crossvein little curved and rather perpendicular; scutellum nearly devoid of setulæ; paramera ham-shaped, the terminal part slender and uncinate. Me., Mass.,* N. H., Vt.,* N. J., Ct., N. Y., Pa., D. C., N. Car., Queb., Cnt.,* Ill.,* Col., Mont*., Wash.,* B. C......**plebeia** Loew

Paraorbits only subshining, narrow.. 5

5. Arista bushy-plumose, third antennal joint subtriangular, excised above, second joint with 2 or 3 long bristles above, of ♂ quadrate in outline, of ♀ somewhat longer; cervical spot distinct, with blackish center, orbito-antennal spot black or brown, interfrontal stripe widest about two-thirds its length and almost reaching suture, ocelli equidistant; hind femora ♂ with 3 or 4 dorsal bristles and below densely bristly and spinose, of ♀ with 4 or 5 dorsal and 3 anterior bristles; costal margin infumated, posterior crossvein sinuate and oblique.............. 6

Plumosity of arista relatively less dense, third antennal joint less or not at all drawn out; posterior crossvein arcuate or straight and less oblique.. 8

6. Paramera of hypopygium in outline somewhat ham-shaped, terminating in a thin strip; third antennal joint more acutely triangular; general color ochraceous, thoracic vittæ usually quite indistinct.............. 7

Paramera short, the thickened portion hourglass-shaped, with explanate and obliquely truncate end; interfrontal stripe usually not bordered by brown; third antennal joint bluntly triangular; general color ferruginous, thoracic vittæ distinct; middle tibiæ with preapical bristle. Wash.,* Id.,* Cal.*..................................**obtusifibula,** n. sp.

7. Middle femora with preapical bristle on posterior side, hind femora with 4 extensor bristles; paramera apically narrow and angulate. Mass.,* N. H., Vt., Ct., N. Y., Pa.,* N. J., Md., Va., Can., Mich. (Hough), Wis.,* Ill.,* Mo., Col. (Hough), N. Mex., Wyo.,* Mont.,* Ut., Nev., Wash.,* Or. (Cole), Cal.,* B. C.,* Alaska*, Mex. (*plumosa* Loew)..**vicina** Macquart

Middle femora lacking preapical bristle, hind femora with 3 extensor bristles; paramera apically broad and ribbon-like. Mont.,* Id.,* Wash.*..**soror,** n. sp.

8. Right underside of last hypopygial segment bearing a strong thumb-like process, basal portion of terminal paramera elongate and parallel-sided, fifth tergite ♂ subquadrate, the fourth sternite with two apical dense patches of black spinules; third antennal joint ovoid, the arista loosely plumose; interfrontal stripe narrow, stopping at opaque border of frontal suture, and not bordered with brown, no antennal or cervical dark spots; posterior ocelli approximate; costal border not dark. Mont.,* Wyom.,* Wash.*..............................**papillifera,** n. sp.

Hypopygium symmetrically globose, fifth tergite ♂ laterally rounded, the fourth sternite with less evident patches of setulæ; interfrontal stripe encroaching on opaque frontal margin.............................. 9

9. Upper side of third antennal joint distinctly excised, arista moderately plumose; usually a trace of the antennal-orbital spot, cervical spot with brown center; ocelli usually equidistant; hind femora ♀ usually with 3 bristles above and 3 in lower anterior row; costal margin scarcely clouded...10

Third antennal joint ovoid, but slightly flattened above; posterior ocelli usually approximate; no posterior preapical bristle on middle femora, hind femora of known females with 1 or 2 bristles beneath on anterior edge...11

10. Paramera short, broad and thin, irregularly rhomboidal, the apical portion semicircular; a strong preapical bristle on posterior side of middle femora; posterior crossvein arcuate. N. H., Ont.,* Queb.,* N. Y., Ill.,* Wisc.,* Col., Wyo.,* Mont.,* Wash.,* B. C., Alaska.* **triangularis** Loew

Paramera long and slender, densely setulose along lower edge; middle femora lacking the preapical bristle; posterior crossvein nearly straight. Eur.*; Ont., N. Y. (Fallen, Dipt. Suec., Sciom. 9 (1820); Cresson, 64). **ferruginea** Fallen

11. End portion of hypopygial paramera spirally hooked, much longer than basal portion; antennal and cervical spots distinct; plumosity of arista rather short and close; thorax vittate; costa clouded, posterior crossvein straight and nearly perpendicular; 6 mm. Mont.*...**spirifera,** n. sp.

End portion of the contorted pollinose paramera expanded leaf-like and transparent; no orbital or cervical dark spots; front semitranslucent, the stripes not strongly differentiated; hairs of arista long and sparse; thorax not vittate; costa and apical veins somewhat clouded; 5 to 6.5 mm...12

Paramera narrowly triangular, the end and basal portions more or less merging; arista openly plumose, the hairs long; 6 to 8 mm..............13

12. Paramera constricted at middle, basal part ventrally setulose, edge of hypopygium deeply excised in front of paramera; posterior crossvein nearly straight. Eur.,* Me. (Loew, Stettin. Ent. Ztg. VIII, 19 (1847); Schiner, Faun. Austr. II. 57 (1864); Hendel, Verh. z. b. Ges. Wien, L. 337 (1900); Cresson, 59)........................**unicolor** Loew

Paramera large, not constricted at beginning of the expanded apical part, not setulose, edge of hypopygium straight; posterior crossvein curved. Wash.*......................................**phyllophora,** n. sp.

13. End of paramera tapering; costal margin clouded, posterior crossvein perpendicular, fourth vein frequently with stubs. Can., Vt.,* N. H., Ct., N. Y.,* Wisc., Col., Mont.*...................**rotundicornis** Loew

End of paramera duckbill-shaped; costa not clouded, posterior crossvein rather oblique. Wyo.,* Mont.*............................**montana** Day

End portion of paramera suddenly constricted and blunt; costal margin distinctly clouded, posterior crossvein arched and oblique. Eur.;* N. H., Vt., Ct., N. Y., D. C. (Fabr. Sp. Ins. II, 441 (1781); Schiner, Faun. Austr. II, 53 (1864); Hendel, Verh. z. b. Ges. Wien, L. 342 (1900); Cresson, 59)..**elata** Fabricius

Tetanocera soror new species.

Length, 6 to 9 mm. Very close to *T. vicina* Macq., the general size of about seven millimeters being slightly smaller. Ochraceous, interfrontal stripe parallel-sided, bordered with brown, cervical and antennal orbital spots black; second antennal joint shorter than the acute third, arista very densely bushy. Thorax heavily pollinose, vittæ distinct, about four rows of setulæ on middle stripe. Abdomen subshining, hypopygium moderately small, paramera short, bluntly rounded triangular, not setulose, foramen large. Tarsi apically dark, front femora with six setæ above, middle femora with one anterior bristle at middle and none behind, hind femora with three dorsal and a double full series of ventral bristles and flexor setulæ. Wings lutescent basally, outer costal and apical portions infumated, crossveins bordered with black, posterior crossvein lightly sinuous.

Type: Mica, Washington,* 14 July, 1918. Thirteen paratypes, Pullman and Mount Constitution, Washington;* Avon, Idaho;* Beaver Creek, Montana,* (Hunter).

Tetanocera obtusifibula new species.

Length, 8 to 11 mm. Closely resembling *T. vicina*, the males easily recognizable by the centrally constricted tubular paramera of the hypopygium. Cervical spot dark brown bounded by yellow; interfrontal stripe reaching to or beyond the middle of the luteous sutural band, laterally bounded with brown; orbital spot at antennæ black, merging into golden at the eye; face and checks golden sericeous; outer side of second antennal joint one-fourth longer than deep, third joint triangular, with rounded excision above and apically rather pointed; arista very bushy plumose, with stout base. Thorax with complete median pair of rusty brown vittæ and with two interrupted lateral stripes, making six vittæ between the wings. Abdomen uniformly ferruginous yellow, paramera of hypopygium not pollinose, relatively short and thick, somewhat constricted at the middle and apically obliquely truncate. Only apical joints of tarsi blackened, front femora with about seven bristles above, middle femora with one anterior bristle, hind femora with four or five bristles above and in male with a complete row below, in female with two or three in front below proximal to the row of about ten setæ. Wings with yellowish tinge, the apical half of costal margin slightly infumated, crossveins slightly clouded, posterior crossvein sinuous.

Thirty-seven specimens. Pullman and Mount Constitution, Washington;* Worley, Idaho;* Stanford, California.* June to September. The females are difficult to distinguish from large and vittate specimens of *T. vicina*. Although somewhat variable, the following characters will help: In *obtusifibula* the small spur of the preapical pair on the hind tibiæ is about two-thirds, instead of less than one-half, the length of the larger; the apical row of setæ of the underside of the hind femora contains about ten, instead of about eight, setæ, proximal to which are two or three or even four, instead of one or two, stout bristles, while in the posterior inferior row of the hind femora are three or rarely four relatively weak, instead of four relatively strong, bristles; the middle stripe of the front is usually narrower, typically about one-half, instead of two-thirds, as wide as long and usually the sutural luteous band is somewhat wider.

Tetanocera papillifera new species.

Male—Length, 9–10 mm. Ochraceous; resembling *vicina*, but readily distinct in structure of hypopygium. Front quadrate, dull luteous along the suture, interfrontal and parafrontal stripes shining, the former one-eighth the width of front and interrupted by the transverse luteous band; face greatly receding, silky white, the silvery occipital spot with pale brown center; second and third antennal joints subequal, the second joint expanding from the base and rather strongly setulose, third joint one-half longer than deep, with evenly rounded apex; arista black, with enlarged base, plumose with fine long and rather sparse hairs. Mesonotum marked with six narrow brown vittæ, the central pair longest, but not attaining the neck. A notopleural light brown stripe extending along the pale yellow pluræ, metapleural callosity light brown, sternopleural setulæ distinct. Abdomen subshining, setulose, fifth tergite fringed with about twelve long apical bristles, laterally nearly straight and parallel-sided, transversely narrower than the third or fourth tergites; hypopygium finely setulose, the terminal portion bearing a strong mammiform papilla on the right side at the apex, foramen large, circular; double patches of black setulæ of last sternite dense. Legs entirely yellowish, wings nearly hyaline, crossveins infumated; posterior crossvein slightly arched.

Type, Pullman, Washington; paratypes, same locality and Tacoma, Washington; Yellowstone Lake, Wyoming; Missoula, Montana. All the specimens were taken during August.

Tetanocera spirifera new species.

Male—Length 6 mm. Front yellow, orbits silvery, paraorbits scarcely shining, middle stripe depressed, narrow, extending through the luteous fascia, its nearly parallel sides bounded by brown; antennal orbital spot brown, cervical spot brown, enclosed by a silvery mark; face and cheeks sericeous white; antennæ relatively short, the second joint obconic, as long as deep and three-fifths the length of the bluntly triangular, almost quadrate, third joint, arista two-thirds longer than the last joint, its base thick, its plumosity moderately close and long. Mesonotum ochraceous, with narrow light brown acrostichal vittæ and broader lateral stripes; pleuræ pale ochraceous, with superior fulvous band as usual. Abdomen unicolorous ochraceous, hypopygium moderate, with pronounced posterior swelling before the foramen, paramera short, very slender, twisted corkscrew-like. Legs yellow, tarsi dusky, front coxæ with four bristles, front femora with four dorsal bristles, middle femora with one anterior bristle, hind femora with two dorsal and about six short bristles in each flexor row in addition to the apical pectination and proximal moderately sparse setulæ. Wings with yellowish tinge, costal margin, apex and crossveins infumated, sections of fourth vein proportioned 1 : 0.8 : 1, posterior crossvein gently curved, anal vein slightly longer than half the discal cell.

Type and female, Nigger Hills of Powell County, Montana,* July, received from Wm. M. Mann; paratype male, Gardiner, Montana,* 17 August, 1918.

Tetanocera phyllophora new species.

Male—Length, 6.5 mm. Front yellow, somewhat translucent, parafrontal stripes subshining, median stripe scarcely depressed, narrowly triangular, vanishing at the luteous sutural edge; occiput subshining yellow, no cervical dark spot; face and cheeks pale yellow, sericeous; antennæ relatively short, second joint obconic, as deep as long and three-fifths the length of the third joint, the last rounded triangular, one-third longer than deep at base, the lower edge convex, arista delicate, scarcely twice as long as the third joint, loosely plumose. Mesonotum uniformly ferruginous-yellow, not vittate; pleuræ dusted, ochraceous below the pale brownish notopleural portion. Abdomen ochraceous, foramen of hypopygium small, paramera long, curved, pollinose except on the pubescent, shining, explanate, pointed tip. Legs entirely yellow, front femora with five outstanding dorsal bristles, middle femora with one anterior bristle, hind femora with two dorsal bristles, and about five below in addition to abundant flexor setæ along the entire length. Wings with flavescent tinge, veins yellowish toward base and brownish distally, crossveins strongly and wing-tip weakly infumated, posterior crossvein gently curved, sections of fourth vein proportioned 1 : 0.9 : 1, anal vein not exceeding half the length of the discal cell.

Holotype: Mount Constitution, Orcas Island, Washington,* 7 August, 1909. While there are two normal fronto-orbital bristles on the right side, the anterior is completely lacking on the left. Were a single fronto-orbital a normal occurrence, the shortened antennæ and the narrow tapering interfrontal stripe would be suggestive of *Renocera*. The species is closely related to *T. unicolor* Loew.

Sepedon Latreille.

Middle femora spinose beneath; wings brown or strongly infumated, third and fourth veins apically converging; length about 8 mm.......... 2

Middle femora not spinose, hind femora relatively short and stout, none of the femora black-tipped; wings grayish, third and fourth veins parallel; frontal spot black; third antennal joint blunt, arista mostly white and half again longer than the third antennal joint; length about 5 mm.......... 6

2. Second antennal joint as thick as the bluntly triangular third; thorax, abdomen and legs reddish brown; frontal spot velvety brown; halteres yellowish; hind femora not excessively long.......... 3

Second antennal joint very slender and long, arista largely dark and nearly twice the length of the third antennal joint; abdomen at least metallic blue; all femora tipped with black, hind femora slender and nearly twice as long as abdomen.......... 4

3. Third and fourth veins nearly parallel; central depression of front three times as wide as lateral depression. Me. (Hough), Mass.,* R. I., N. Y.,* Queb., Ont.,* N. J., Pa., Md., Ill.,* Ida.,* Man.......**fuscipennis** Loew

Third and fourth veins slightly convergent; central depression of front less than twice as wide as lateral depression. Wyo.,* Ut., Ida.,* Wash.,* Cal. (Cresson, Ent. News, XXV, 457 (1914)...**pacifica** Cresson

4. Front broadly excavated, with weak ridges; posterior crossvein bowed outwards. D. C., Md., Va. (Cresson, 84)........**tenuicornis** Cresson

Front narrowly excavated, with prominent ridges; posterior crossvein straight.......... 5

5. Hind femora with blackish annulus beyond the middle; velvety frontal spot concolorous with shining portion of front; thorax reddish; third antennal joint acute; halteres brownish. Jam., Porto Rico, Cuba,* Mex., Tex. (*nigriventris* Wulp)..........**macropus** Walker

Hind femora not annulate but black on apical third; frontal spot black; thorax with two pronounced blue vittæ; third antennal joint with rounded apex; knob of halteres black. Haiti.*..........**cæruleus**, n. sp.

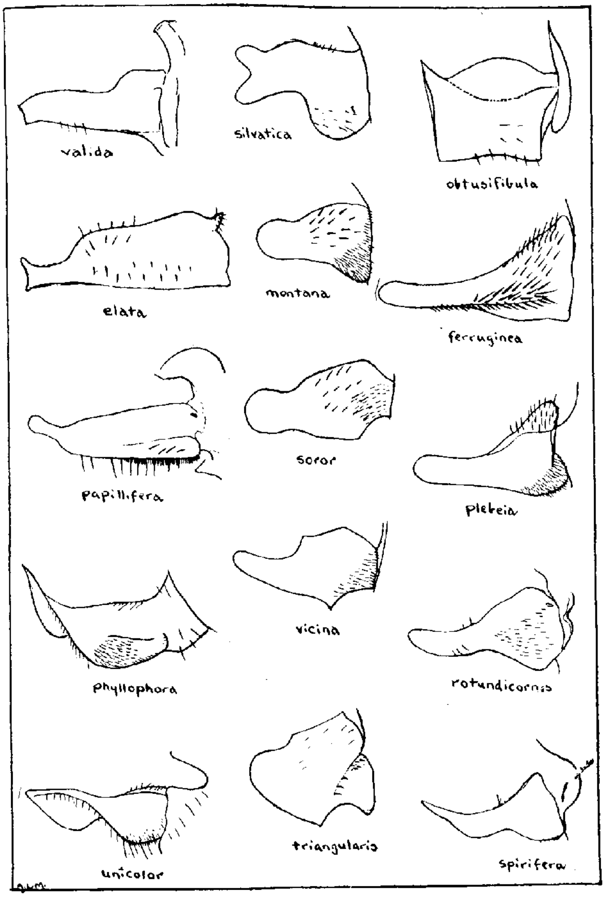
6. Underside of ♂ hind femora deeply excised and bearing 2 prongs; color generally yellowish brown; apical segments of ♀ abdomen compressed, carinate above. Mass.,* Ct., N. Y., Ont.,* Md., D. C.,* N. J., Ga., Ohio, Ill.,* Mich., S. D., Col., Tex.,* Mont.,* Wyom.,* Wash.,* Cal. **armipes** Loew

Femora of both sexes simple; color generally piceous; apical segments of ♀ arched above. Mass.,* N. H., N. Y.,* N. J., Md., D. C., Va., Ga., Mid. States, Neb., Wyo.,* Mont.,* Ida.,* Wash.,* Cal...**pusillus** Loew

Sepedon cæruleus new species.

Male—Length, 8 mm. Head yellow, a shield-shaped cervical spot and an elongate infraocular mark white-pruinose, black orbital spots at middle of front and at antennæ, upper frontal orbits dusky; antennæ black, first joint quadrate, second joint attenuated, two-thirds longer than the third, which is twice as long as deep and apically rounded, arista nearly twice the length of the third antennal joint, white on apical half and basally brown, its second joint four times as long as wide; palpi yellow. the extreme tip dusky. Mesonotum metallic blue between the complete median black vitta and the sides, scutellum medially black from a continuation of the notal vitta and laterally blue; upper pleuræ with reddish tinge, lower bluish superimposed with white pollen. Abdomen entirely dark blue with bronze tinge. Legs, including coxæ, mostly reddish yellow, femora tipped with black, the hind pair more broadly so, hind tibiæ dark, except a subapical band, tarsi dusky, front femora not spinose. Halteres with blackened knob. Wings strongly infumated, veins black, first posterior cell as wide at middle as the end of the discal cell, anal vein incomplete, sections of fourth vein equal, posterior crossvein arched, but much less oblique than in *S. fuscipennis*.

Holotype: Haiti,* received from Dr. Hough.



Left terminal valve of hypopygium of the American species of *Tetanocera*.

A. L. Melander